



Class _____

Book _____

COPYRIGHT DEPOSIT

HEALTH STRENGTH
AND HAPPINESS

By DR. SALEEBY

THE CYCLE OF LIFE

EVOLUTION THE MASTER KEY

WORRY, THE DISEASE OF THE AGE

THE CONQUEST OF CANCER: A PLAN OF
CAMPAIGN

BIOLOGY AND HISTORY (Pamphlet)

HEALTH STRENGTH AND HAPPINESS

A BOOK OF PRACTICAL ADVICE

BY

C. W. SALEEBY, M.D., F.R.S. EDIN.



NEW YORK
MITCHELL KENNERLEY

2 East 29th Street

LONDON: GRANT RICHARDS

MCMVIII

Copyright 1908 by
Mitchell Kennerley

RA 776
S25

LIBRARY of CONGRESS	
Two Copies Received	
OCT 29 1908	
Copyright Entry	
Oct. 28, 1908	
CLASS	XXc. No.
229003	
COPY B.	

PREFACE

This book is written for the young man, the man of middle age, and the elderly—not least for the prematurely elderly. Any attempt to include the hygiene of childhood would have been ridiculous, for it is my purpose to regard the mind as the foremost thing in man at all ages, and a proper discussion of childhood would therefore involve the treatment of what we call education. The child is not merely a peculiar animal, as many seem to think, nor yet a discarnate mind of small size, as the old pedagogy thought, but a being composed of mental and physical factors all characteristic and yet protean. It is the most fascinating subject in the world, and I propose to devote a separate volume to it.

Similarly as regards woman. The greater part of the characters of men and women are not male and female, but simply human. The principles of hygiene are fundamentally the same for both. The needs of the human being as regards air and food and clothing and exercise are almost identical, if not absolutely so, for the two sexes. There is included in these pages the discussion of all these sexless questions, which are at least as urgent for women as for men, and of greater racial importance in their case. The hair, for instance, is sexless, and the principles of its care—to which we

shall condescend to allude, condescension though it certainly be—are the same for both sexes. In this particular case man may learn a great deal from the practice of woman, which is obviously much more successful than his own.

There will remain, however, a number of momentous questions which concern woman alone directly—though all coming ages through her. It has to be asked how far “Woman in Transition” is woman in transition from womanhood to something which is not manhood and for which no word exists. The fact that some women are now earning their living as steeplejacks, or whatever it may be, must not deter us from asking totally without reference to what our grandmothers would have thought, whether the hygiene of womanhood is really compatible in the highest degree with any profession but one—and that one supreme; and an effort should be made to put a period to the un wisdom of which the bitter fruit is so much hysteria, neurasthenia, and chronic illness of all sorts amongst women. To this whole subject, which seems to me to have the gravest social consequences, I also propose to devote a special volume. Meanwhile the whole of the present volume is relevant to the needs of women considered simply as human beings, possessed of such souls and appetites and physical needs as men possess, and of at least equal importance in the scale of being.

CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	9
II. THE NEW ASCETICISM	14
III. THE NEED OF AIR	25
IV. THE NEED OF LIGHT	43
V. THE NEED OF CLOTHES	50
VI. CLOTHING IN DETAIL	64
VII. THE NEED OF EXERCISE	83
VIII. THE NEED OF SLEEP	102
IX. CONCERNING DRUGS AND DRUGGING	131
X. THE QUESTION OF ALCOHOL	152
XI. TEA, COFFEE, COCOA AND TOBACCO	190
XII. IN PRAISE OF MILK	204
XIII. IN PRAISE OF BREAD	213
XIV. FOODS AND APPETITES	225
XV. THE USE OF MEAT	250
XVI. THE NEW SCHOOL OF DIETETICS	266
XVII. THE CARE OF THE BOWEL	281
XVIII. THE SKIN AND ITS APPENDAGES	288
XIX. CARE OF THE TEETH	296
XX. ON GROWING STOUT AND GROWING OLD	303
XXI. THE ELIXIR OF YOUTH	315
XXII. THE CARE OF THE SENSES	325
XXIII. THE RACIAL FUNCTIONS	344
XXIV. CONCERNING HEREDITY	366
XXV. THE TRANSMISSION OF CONTAGIOUS DISEASE	384

HEALTH STRENGTH AND HAPPINESS

I

INTRODUCTION

SUCH books as this might be are amongst the chief makers of hypochondriacs—people who make themselves ill by trying to keep well. Of all the absurd uses to which to put one's mind this is chief—to make a nuisance of the body. In order to preserve the health of the liver, for instance, the first necessity is to forget that one possesses a liver. Probably one does, but many people make themselves ill by concern about organs which, as like as not, they do not possess. The case of that nightmare, the stomach, is quite similar, and my foremost piece of advice on the subject of food should be, I almost believe, to take no one's advice on this subject. We think far too much about our bodies nowadays, and doctors are not without their share of blame in this respect. The body is a necessary evil, and like other necessary evils should be ignored as far as possible, just as the existence of unnecessary evils should be shouted from the house-tops in season and out of season. Thus, if I allude to anatomy in the following pages, I shall do so in a quite casual and incidental fashion. It is possible for every one but the surgeon to know too much anatomy. (Not one pain in a thousand in the appendix region has anything to do with

appendicitis, and you are preserved from faulty diagnosis in this respect if you do not know where your appendix is. As a matter of fact, no one can tell where his appendix is until an operation is performed, for its site is most variable.

My object is to enable the reader to reduce to a minimum the conscious attention demanded by his body, whether in health or in disease. To this end we shall have to discuss many precise details, to issue warnings, and to indict many prevalent habits. This knowledge, however, will not fetter but liberate. To know what to fear is to know what not to fear. To acquire sensible habits is not necessarily more difficult than to acquire senseless habits; and once a habit is formed, the conscious mind can turn its attention elsewhere. No one thinks less about his body than I do, and this is the chief reason why I have so little occasion to think about it. If I happen to know the usual rate of my pulse, that is only because this is sometimes a convenient means, as Galileo knew, of measuring time when a watch is not at hand or when the observation is not desired to be obtrusive. I have not seen my tongue for years—and have not missed much, I am sure. Unlike children, tongues should be heard but not seen.

Almost the only certain fact of dietetics is that one man's meat is another man's poison, just as one man's fresh air is another man's draught. We are assured that the amylolytic stage of gastric digestion occupies about twenty minutes to half-an-hour. It is heartily welcome; but the primeval savage who cooked his hare when he could catch it, and starved when he could not, has the laugh of the dyspeptic physiologist. To say "Stomach, be thou my cross," is as foolish as to say "Stomach, be thou my god": the only wise thing to say is, "Stomach, mind thy business, and I will mind mine." There is going to be no truckling to stomachs or livers in these pages.

I belong to no special school of medical or dietetic thought, except that which believes in the healing power of Nature, the *vis medicatrix Naturæ*, and in the power of the mind over the body. I am not a Fletcherite nor a vegetarian, nor a fruitarian, nor a Christian Scientist. I do not worship at the shrine of muscle, and I consume many uric-acid yielding articles of diet. The most amazing and almost the most significant thing about man the animal to me is the illimitable variety and diversity of the practices which are compatible with his health. I see athletic records broken, and admirable mental energy exhibited by rigid vegetarians (so-called), but am sure that they do not enjoy better health or turn out more work than others, who eat what they like, when they like, and because they like it, omit a meal or take two for one as convenience dictates, and find themselves just as well when they take no exercise as when they play two games of cricket or hockey a week. This adaptability of man, which doubtless exceeds that of any other living creature, animal or vegetable, is a capital fact in history and has helped to make him the lord of the earth, and the most widely distributed creature upon its surface. It makes supremely silly all the systems and doctrines which ignore it and declare that this way alone lie health and happiness. Our purpose will be, whilst insisting upon this extraordinary adaptability of man, to point out its limits and the probable price to be paid for exceeding them. Man lives in the Tropics and in the Polar regions, and no other animal can compare with him in this respect; but doubtless he has an optimum temperature, at which he thrives best, just as microbes have. It will be our business to indicate these best average conditions for human life, whilst recognising and welcoming the existence of many persons who thrive and have thrived upon their defiance.

One thing, however, with all his powers of adapta-

tion, man will not stand, and that is the constant and solicitous contemplation of his own person. With all its quackery and nonsense, Christian Science has recognised this truth as no religious or medical corporation has recognised it hitherto: and this it is which suffices to explain its success. The common medical attitude, in Great Britain, at any rate, is to regard Christian Science as pure humbug, and to load it with abuse. This is not found convincing by the man whom Christian Science has served; and it seems very foolish to those who have any acquaintance with the subject of therapeutic suggestion and its application in the hypnotic state, a great healing power which conservatism and prejudice have long ignored and still ignore in this country. The reasonable attitude for the man who has any notion of what is meant by natural selection or the survival of the fittest, is to ask what are the factors which give this thing its survival-value. To answer self-deception is to beg the question. If a man thinks he has no pain, he has no pain; and this is the most that you can say for yourself at any time. Christian Science has achieved the exploitation of a great truth—doubtless only a half or three-quarter truth, but still truth so far—and it is this that has given it its success. Furthermore, its philosophy is sound as a working hypothesis, at least.

If I were in medical practice the first question I should feel inclined to ask of half my patients would be, Are you a body or a soul? The question is philosophically illegitimate, we know; but it is practically valid and momentous. Evolutionist though I be, I confess myself somewhat weary of the glorious truth that man is an animal. "The question," said Disraeli, "is whether man is an ape or an angel, and I am on the side of the angels." The truth is, of course, that he is both, and that a house divided against itself cannot stand. For practical purposes, a man has to decide

whether he is a soul or a body, or, if both, which shall be master. The body is a good servant but a bad master. The difference between man and a microbe or a monkey is that such rudimentary souls as the latter possess are the servants of the body, whilst the body of man is his servant. This is the truth which Christian Science recognises in its exaggerated way. We shall here assume that we discuss not a more or less sensitive and conscious piece of machinery but an Ego or a Self, possessed of such machinery and dependent upon it as upon an indispensable servant. We shall attempt to define the conditions of bodily health, not as an end in itself, but as a necessary condition of mental happiness, which is, legitimately construed, the legitimate end of human existence. Thus we shall seek to state not how to have a healthy stomach, but how not to know you have a stomach—which comes to the same thing. The maintenance of health depends not upon continuous attention to bodily needs—which will wreck the health of the strongest—but on the formation of healthy habits; and the value of such habits is that, once formed, they can be left to the sub-conscious mind, whilst the conscious self, instead of feeling itself for ever chained to the body of this death, can dance in its fetters.

THE NEW ASCETICISM

THE cardinal principle of all asceticism, new or old, is surely that the mind or soul or *psyche* is the all—Man is a important part of man, and that his body mind has no place or purpose or warrant but to serve it. This is a supremely great and noble conception, of which there is need in every age, and certainly not least need to-day. It is to our discredit, indeed, that at the present time, when the psychical factors more completely outweigh the physical factors than ever before in the struggle for individual, national, and racial existence, we should yet have to learn this lesson of the ancients, amongst whom such physical factors as muscular strength and endurance were indeed of far greater relative value for life—as they are, of course, amongst the lower animals. If, then, it be the principle of all asceticism that there is nothing great in man but mind—mind, indeed, being the only important matter—none of us can hesitate to respect it. Our contempt, or disdain, or disregard of asceticism, as it has been practised before our time, cannot possibly be based upon any question of the truth of the underlying idea. He who, at whatever cost or under whatever delusions, seeks to treat his body in such a fashion as will make for the dignity and worth of his mind, has a high ideal of personal duty, and is noble and reverend, however lamentable the result or ludicrous the method.

The old asceticism believed that a whole truth and not a half truth was expressed by the doctrine of the The old antagonism between the interests of mind asceticism and body. So far as the supreme interests of the soul were concerned, the body was simply an enemy and a nuisance. Everything that it desired, or that encouraged it, was necessarily an affront to its irreconcilable enemy, the soul. Only by consistently

thwarting, starving, repressing the body, could a man do his duty to his higher part; and there was no discharge in that war.

Now, before we consider how modern knowledge modifies this ancient view of the relation **The body a** between the physical and psychical parts of **burden—** man, let us remind ourselves that the burden of the body is a tyranny and a nuisance to-day.

Even the case of a man who enjoys perfect health suffices to point the argument. To begin with, there is the need of sleep, upon which the nervous system insists. About one-third of our lives is thus vegetably spent. A problem of the future will be to dispose of this necessity, which so seriously reduces the sum of our brief consciousness. In this respect, natural selection, which now acts mainly on such factors, will doubtless help to evolve a race that is not compelled to sleep one-third of its life away, but sleeps *deeply*, i. e. *quickly*. Still within the limits of perfect health, consider the necessity for clothing, which compels us to devote much of our lives to dressing and undressing. Then this body of ours is incessantly soiling itself and becoming soiled from without, and we have to wait upon its need for cleanliness daily. And there are our nails, which we cannot even prevent, once and for all, from continuing to grow, and which will not keep clean for an hour at a time. Considered *sub specie aeternitatis*, what can well be more utterly beneath the dignity of a thinking being, than the necessity to devote part of his brief span of life to waiting upon the nails which his body inherits from the days when claws were necessary implements of life? Then again, our hair: the need for brushing the hair is a daily annoyance to which custom never inures at least one man, and never will—until, perchance, it departs and gives him the liberty from bodily tyranny which, in this respect, the bald man enjoys. Shaving, I take it,

is wholly incompatible with the principles of the new asceticism, except for the surgeon and the dentist; but my hopes that the Röntgen rays would prove to be a safe depilatory and so liberate my sex from the tyranny of the chin, have been unrealised. Alas, that a man should be shaving his chin or trimming his beard when he might be doing any of the thousand things worthy of the state of man, and inexhaustible did he live for ever! And all this, and endless eating and drinking, and not one of these things can be done once for all and be done with! Yet this is nothing to the burden of the body when it is not well. Perhaps we should realise the weight of this burden of ours if, instead of our own bodies, it were some one else's upon which we had to wait incessantly, feeding and scrubbing, and clipping and paring, and dressing and undressing it day after day, and never a single holiday in our lives. Thus reflecting, one may be excused for the wish that it were possible to be rid of the body altogether—say by taking it out and dropping it in the gutter some dark night.

However, we know nowadays that the body and the mind are intimately related in such wise that injury but a good to the one is injury to the other; and this servant—fact it is which must differentiate the new from the old asceticism, the new from the old idea of the *whole duty of health*. The body is a servant which, however troublesome and vexatious, and even humiliating, in its reminders of the brute, is yet indispensable to our welfare. Even apart from the consideration that this is a very old servant of the family, we find that it pays us to treat him well. But the principle of the new asceticism is that our treatment of this troublesome retainer and our discharge of our duty to him must never be such that he becomes the master. His welfare is never an end in itself. If the eye or the hand or the foot offends *us*, it were well to pluck them from us or

cut them off and maintain the integrity and dignity of the *psyche*, even though the maiming of the body be the price we have to pay. The new asceticism must assert the value and the duty of exercise, but it has only contempt for the ludicrous cult of muscle which is one of the follies of the age. The body, as we were taught nearly two thousand years ago, is indeed the temple of something immeasurably higher than itself, and that something we rightly worship, for the *psyche* of man is the highest thing we know; but whilst the worship of that which the temple enshrines is truly religious, the worship of the temple itself is nothing but idolatry. It may well be that the modern recognition and publication of the facts and laws of physiology, the wide interest in questions of health and disease, involve the very real risk that the body may become the god of our idolatry. To the worshippers of muscle may be quoted the verse of the psalmist, who reminds us that the Lord "taketh not pleasure in the legs of a man. The Lord taketh pleasure in those that fear him, in those that hope in his mercy." It is part of the business of the new asceticism to inquire into this matter of the legs of a man, and ask how they should be treated—but on the definite assumption that their well-being and strength is not an end in itself, but merely to be sought in so far as it serves the man himself.

Apart from its insane and morbid form, the asceticism of the past concerned itself essentially with the avoidance of excess. Logically, perhaps, and needs
the only complete expression of the old good treat-
asceticism should have been suicide. But ment—
it did not carry its belief in the antagonism between body and soul so far, though it often involved physical mutilation—which, upon my word, would be a very good thing for many of us in many directions. But in practice it was recognised that a certain minimum well-being of the body was indispensable for the main-

tenance of its connection with the soul; whilst anything beyond that minimum must constitute an affront and an injury to the soul. The new asceticism, with its totally different conception of the relation between our two components, cannot agree that the *psyche* is at its best when the body is at its worst or lowest compatible with life. We know the contrary. Nevertheless, such are our present habits that the new asceticism is bound to lay the major stress upon our habits of physical excess and only the minor stress upon our habits of physical defect. Except, perhaps, in the matter of sleep, it is not a defect in meeting the requirements of the body that prevents most or all of us from reaching our full height as intellectual and spiritual beings, or, if you so prefer, from enjoying life to the utmost possible.

On the other hand, that physical excess against which the old asceticism was a protest is perhaps more short of markedly exemplified in ourselves than ever pampering in the past. Take the case of diet, for instance. It has now been quite definitely proved, by rigid experiment as contrasted with previous haphazard observation, that practically all well-to-do people are guilty of excess in the matter of food and drink. Here, in accordance with our principles, the word excess is used with definite relation to the mind. It is not merely that we eat more than we need, it is not that most of us carry more fat about with us than is required for the warmth or the protection or the reserve needs of the body; it is that we eat and drink more than is good for our minds. I refer both to quality and quantity of mind, and to quantity especially in relation to age. The lamp of genius, said Schiller, burns quicker than the lamp of life, and alas that it should be so. Quite apart from the fact of premature death, and that there is not one death in many thou-

sands that is not more or less premature, what of the premature extinction of the mind and especially of the lamp of genius which expires, whilst the bodily frame continues to use its useless life? History is full of such cases, and they are to be seen all around us. The new asceticism will totally deny the inherent truth of Schiller's saying. There is no reason why the lamp of genius should burn quicker than the lamp of life. There are octogenarians in society to-day whose names are known and honoured wherever men love the light and the givers of light. Some of these men, though deaf or muscularly frail, lame, blind, physically decrepit and senile, are doing as good and as original and as fertile work now as they did in their thirties. Their case and many historic ones may be cited against those to which Schiller alluded. In these men the physical life has nearly burnt itself out, but the lamp of their genius burns as brightly as ever it did. Now, whatever others may care to suppose, the instructed few are very sure that the difference between the two sets of cases does not depend upon the mind in question, but upon the body and its treatment. If a man has good and fine mental qualities, and if he does his duty to his body, he may be assured that they will certainly not leave him. For this purpose we have to distinguish between the nervous system or the brain and the rest of the body. The brains of these old men to whom I allude, are still young brains, as the results prove. They have not been subjected to systematic food poisoning, or drink poisoning, or drug poisoning. They have always been their owners' first care; and so the legs of a man may grow lame, or the lens of his eye grow dim, or the joints of the little bones in his ear grow stiff, or he may lose a foot or a hand, or what not, but as long as his brain is supplied by soft arteries with pure blood, the man himself, as we wisely say, will be *all there*.

Hence it is possible to define the principles and practice of the new asceticism in terms which involve no unproved or unscientific theory of the mind, but are as concrete and practical as can be. We may say, simply, that the essential part of man is his nervous system. Historically, the nervous system was evolved as a servant of the body, intended to co-ordinate its parts and expedite its activities. The relation is now reversed, and we may conceive of liver and lungs and muscles and stomach as existing simply in order to serve the nervous system. Of this the chief part is the brain, and thus the new asceticism is entirely one with the doctrine of Professor Forel, the great psychologist of Zürich, that "the brain is the man."¹ Here is a true and simple phrase which may be accepted as a proximate truth by every one, and which commits us to no theory of the soul or the relation between mind and body. We shall not concern ourselves here with the question of the relation between the brain and the mind, for the sufficient reason that this question is superfluous for our discussion. Our purpose is to study the personal conditions of health and happiness, and here we need no deeper nor more precise dogma upon which to build and to which constantly to refer than "the brain is the man." The "average sensual man," then, is one who uses his brain to serve his body, to find attractive food for his stomach or diversion for the centres concerned with racial purposes in his spinal cord. The new ascetic, on the other hand, is he who uses his body to serve his brain, which is the substantial man.

Instead of a metaphysical problem, then, as to brain and mind, all the answers to which are merely "words,

¹ "With human beings the brain is the organ of the mind, and there is far more justification in what we know, nowadays, for saying, 'The brain is the man,' than Buffon had in his time for saying, 'The style is the man.'"

words, words," we have before us a physiological problem, practical, soluble and, in essentials, already solved—the problem of the relation between the brain and the body (or the rest of the body). The chief question which these chapters attempt to answer is "How ought I to treat my body so as best and longest to preserve the health, the vigour, and, therefore, the happiness of my brain—which, for practical purposes, is myself?" This is a true asceticism, vastly though it differs from the asceticism of the past; and it will determine the proportions of our study, and the amount of attention devoted to, let us say, diet on the one hand, and the care of the hair on the other.

Now at this very point it is necessary to realise, very clearly and memorably, the exceeding intimacy of the relations which do subsist between the brain and the body. We shall discover that these are all-embracing, so that our doctrine that the brain is the man by no means lessens, but merely directs, the amount of care and interest which we must rightly devote to the body in general—not for its own good as an end in itself, but for the good of the brain.

This intimacy and interdependence may be illustrated by wholesale borrowing from the last chapter of Herbert Spencer's Autobiography, in which he advances the doctrine that "the mind is as deep as the viscera"—that is to say, the internal organs. The brain is the man, certainly, but this requires qualification by the fact that the rest of the body influences it so profoundly, not only in respect of blood-supply and food, as to warrant the saying: "Mind is not as deep as the brain only, but is, in a sense, as deep as the viscera."

Spencer discusses the mental effects of bodily deformity or excellence, of beauty and ugliness; and after referring to certain well-known facts of physiology, concludes that "Men's characters must be in part deter-

mined by their visceral structures": "an unusually active digestion may, other things equal, be a factor in unusual mental energy": "the brain, depending for its action on a due supply of blood duly purified, must be affected in its efficiency by every variation in the development of this or that excreting organ": "not the quantity of mind only, but the quality of mind also, is in part determined by these psycho-physical connections": "A, who is constitutionally active, takes trouble in doing things for others' gratification, and is credited as essentially altruistic; while B, though his absence of effort for others is due to constitutional inactivity, and not to want of sympathy with them, is thought essentially egoistic": "one of the absurdities current among both cultured and uncultured is that it is as easy for one man to be active as for another." "So, too, in active life the visceral derangements produced by over-work and anxiety are often followed by ill-temper. Even the recognised differences between irritability before dinner and equanimity (sometimes joined with generosity) after dinner, suffice to show that when flagging pulsation and impoverished blood are exchanged for vigorous pulsation and enriched blood, there results the change in the balance of the emotions which constitutes a moral change."

In practice, then, the new asceticism centres its attention upon the brain as the old asceticism did upon the soul. A creative asceticism is possible in full degree only in the bringing up of a child. Any one old enough to read these words is already past the really constructive stage of brain culture. Not merely will not thought nor diet nor exercise add another brain cell to those he already possesses, but the main lines of their position and connections have already been laid down beyond recall. Yet even now there remain tremendously important possibilities, not of creation or construction but main-

tenance. We may assume for the present purpose that the reader possesses a brain at present in fair health and repair. If it has already been injured in its actual anatomy by the poisons of alcohol or certain microbes of disease, or if senile changes so-called, which are really toxic and due to chronic food-poisoning, have already occurred, I cannot undertake that the following of my advice, even were it ideal advice, would restore what has been destroyed. All cell destruction is irreparable. This is true of the mere skin: no remedy for baldness will recreate a hair-follicle once destroyed, and the slightest cut destroys characteristic skin structures which are lost for ever, even though it should heal "by first intention" within a few hours. Much more is this true of the brain. The effects of such poisoning, as merely regards function, can be recovered from, fortunately for all of us: but anatomical destruction is irreparable.

The maintenance of the brain in healthy and happy working order for indefinite periods is, however, as practicable as the re-creation of the smallest and simplest of its two thousand million cells, —and main-
once destroyed, is impracticable. In this tenance business every bodily need and function is relevant. The air we breathe, the clothes we wear, the food and drink we consume; sleep, habits of all kinds, physical and mental; the use of stimulants and narcotics; exercise of the muscles, the senses, the emotions, and the intellect, all are of greater or less moment, and all must concern us here.

I have said that the process of indefinite maintenance is easy and practicable, whilst that of re-creation is impossible. It is well to note that maintenance of what remains is possible at any stage, short of extreme old age or progressive disease such as general paralysis. I shall devote particular attention to a person who has a special interest for me, since his history

involves, I believe, such serious loss to society. This is the middle-aged man, suffering from no actual disease, who is yet not so "fit" as he used to be, gives up the active games which he enjoyed in youth and early manhood, has less energy for both work and play, less initiative, less enthusiasm, a tendency to "put on flesh"—which is not flesh but fat—and, in short, has just started on the downward path. There is no occasion for any of these things at his age. He may expect to lose some agility of body at forty or even less: but there is no need to lose agility of mind for another three decades at least. Just when his powers should be at their height, and when he has accumulated experience, he begins to decline. Society in general suffers, those dependent on him suffer, and he himself suffers, since happiness depends on health, and his state is not health.

The process is not inevitable. It can be arrested at any point by attention to the fundamental laws of bodily and mental health; and I submit the principles of the new asceticism to such an one on the ground that it is his civic, domestic, and personal duty to adopt them. I will not say he should be ashamed of himself, because he sins in ignorance, and is doubtless doing his best and deploring the loss of his youthful vigour and sense of well-being; but I am quite certain that in a wiser age such a man will be looked upon as the obvious glutton or inebriate is looked upon now.

THE NEED OF AIR

WE may begin our systematic discussion with the question of air, since at any moment whatever an adequate supply of air is an immediate and immediately recurrent need of all living things—vegetable, animal, or human. You may not require to eat or sleep for several hours, but you must breathe at once—you are breathing now.

Another very notable advantage of this question, which tempts me to discuss it at once, is that it is not one capable of arousing hypochondria or morbid self-examination. A full discussion of this question cannot injure even the most suggestible and hysterically-inclined woman. I really do not think that any one can be too fussy about the need of pure air, though millions of people are too fussy about the need for its exclusion. Such persons have, in every case, made themselves susceptible to draughts, and can undo their burdensome handiwork. Further, the man or woman who is fussy about the need for fresh air is benefiting other people besides himself, and earns, though he does not obtain, the thanks of all except the tubercle bacillus. I hope this chapter will afford fresh power to his elbow.

We human beings crawl between earth and heaven at the bottom of a great ocean of air, the positive material existence of which it is most difficult to bring home to the mind. We speak of "airy nothings," and the phrase betrays our attitude. It is not Air is a nothing, however, which, when in motion, material can blow down a city; it is not a nothing without which we promptly die. The atmosphere is a material reality, possessed of weight and inertia, and as liable as a cathedral to stay where it is unless and until something moves it. This is the capital fact with which all sys-

tems of ventilation have to reckon and upon which they one and all split.

It is almost a pity that the various ingredients of the atmosphere, healthy and unhealthy, are not possessed of easily-distinguishable colours. Many current practices—only that current is exactly *not* the word—would then cease to afflict us. Imagine the case of a number of fishes living in a closed globe entirely filled with water. From moment to moment they are extracting from it what they need, and pouring into it the waste-products of their life. Every living thing has such waste products, and these are invariably poisons to it. The fishes would soon show signs of poisoning and die. The case is the same with flowers whose water is not changed.

It is the same also with human beings in an unventilated room. Each of them is continuously extracting from the air its life-sustaining ingredient, and pouring into it his waste products. If carbonic acid happened to be of a rich blue colour, we should see the gas emerging from each other's and our own mouths and noses. Or, if it had a pungent and characteristic odour, we should recognise the process which is continuously going on. As it is, however, we commonly notice nothing.

Man is naturally, of course, a creature meant to live in the open air; and it is noteworthy that even **Adaptability** in the twentieth century he has not yet here also found effective means of reproducing indoors the atmospheric conditions which are really normal to him. Before we begin to discuss the requisites, however, it is right to observe that the amazing adaptability of man shows itself in regard to this question also. Many of us survive and even thrive who spend nearly all the day in unventilated apartments and who sleep with our bedroom windows closed. The inuring effect of custom in either direction is difficult to over-

estimate. I remember a consumptive patient whose bed lay in the open air on the balcony outside the ward of which I had charge in Edinburgh. Whenever he was taken indoors to have the state of his chest examined, he complained of the stuffiness of the ward, yet I doubt whether there was a cleaner or more perfectly ventilated apartment to be found anywhere. Only he had been educated up to a high standard.

This is not to say for a moment that most of us do not pay a price for our adaptability. In many cases this is small or inappreciable, but in many more it involves lessened energy, drowsiness, headache, and the like, whilst in tens of thousands it is a necessary factor in the production of consumption.

Not until public opinion is educated on this matter, which directly or indirectly concerns us all, can any substantial improvement be expected. To Ignorance take the case of London alone, I know of public no concert hall or theatre of which the opinion ventilation responds to even the most modest physiological requirements. I have listened to a lecture on respiration in the most famous lecture theatre in the world, in an atmosphere that illustrated everything which the lecturer told us to avoid. The great shops in Regent Street are disgraceful in this respect, and must be responsible for an enormous amount of minor illness and consumption amongst their employees.

The law of the land is, in this respect, as ignorant as the general public, and I must here insist, for the thousandth time, upon the distinction between cubic feet of space and cubic feet of air. The law and the public regard the two terms as synonymous. Hence our recent Factory Commission found that in many cases where the statutory requirements as to cubic feet of air had been met, and more than met, the air contained a highly excessive proportion of impurity. There is not a bedroom in And the law

the land which *contains* sufficient air to last one sleeper the whole night. We talk about "change of air"; if we concerned ourselves with changing the air in our living and sleeping apartments we should have much less need of that "change of air" which we commonly mean by the phrase, and which, in fact, seldom involves any real atmospheric change at all. The real advantage of large "airy" rooms is not that they contain much air, for none contain enough, but that they permit of change of air sufficiently rapid to make good our deterioration of it, without draught. However, if I am writing fifty years hence, I have no doubt that I shall still find occasion to point out the distinction between cubic feet of space and cubic feet of air—which seems always to be as fresh as the air of those who fail to appreciate it is stale.

The body has many means of protection and selection, but it is to be noted that the determination of the **Effects of** gases which enter the blood is mechanical **foul air** and not vital. It depends upon the relative pressures of each ingredient gas of the atmosphere without and within the blood. If this pressure is higher on the outside, the gas enters, whether it be life-giving oxygen or death-dealing carbonic acid or carbonic oxide—in which latter cases the result is blood-poisoning. The noxious gases enter the blood, injuring its own living cells, and are carried by it to all the tissues of the body. It is a matter of no concern to us here whether the carbonic acid gas, or the gases given off by the skin and clothes of our neighbours or ourselves, are the more deleterious. All are more or less noxious. They directly increase our susceptibility to many forms of infectious disease, especially those which attack the respiratory organs. Vastly the most important of these is consumption, but influenza, bronchitis, pneumonia, and the common cold must be included. Destroying the very blood, they cause

anæmia, which itself is a disease and predisposes to others. Interfering with the circulation, they cause local congestions which, when situated within the skull, are responsible for headache. In extreme cases this interference with the circulation leads to fainting. Acting upon the nervous system, they cause drowsiness and incapacity for attention. A chief educational reform of the future will be the ventilation of school-rooms, with direct effects upon the intelligence, attention, and learning capacity of the scholars, quite apart, from any question of physical health. Any writer who could succeed in arousing public opinion on this subject would perform a great national service. It should be amongst the very first demands of all architects who are concerned with the building of any apartments in which human beings are to spend any appreciable time, that they be not poisoned by the foul gases of their own making. This is one of the really effective and rational ways in which to fight consumption, which can never be exterminated until the primal importance of fresh air is universally recognised.

We all say we like fresh air, just as we all say we like music; the hygienist knows that this is cant in the one case and the musician in the other. Not one person in ten at present really likes fresh air, or has educated himself to know the difference between fresh air and stale air. What we really like is to be cosy, and since this is what we really like, this is what we see that we get.

In this matter, as in so many others, we suffer from the medical superstitions of former ages. Consumption was due to "catching cold"—an absolutely nonsensical phrase which should be expunged from rational speech—and the deadly treatment in vogue was to wrap the patient up in heavy clothing, best calculated to increase his fever and perspiration, in a heated room with rubber edging

to the door, and that supremely imbecile invention, a sand-bag, on the window-sill. We bury newspapers under our great bridges and architectural achievements for the instruction of a remote posterity. I would counsel the enclosure of a few sand-bags, with an account of their employment, in order to show what the age that produced Darwin and Pasteur was also capable of, but that it is incredible that such imbecility should be found credible, and the joke would be thought a poor one.

As everyone knows, we treat consumption differently now, and the conditions which often cure it will still oftener prevent it. But it is not so generally known that the case of pneumonia, the most deadly of all acute diseases, is following suit. This, also, was supposed to be due to catching cold, and was treated accordingly. But now the most competent physicians are finding that the fresh-air treatment of pneumonia vastly improves their results. I have yet to hear the disease in which stale air is preferable to fresh air.

But the old delusions still persist. A man spends some hours in a theatre, where abundant germs of "Catch- various kinds are brought and spread by ing cold" his neighbours, and where his resistance is lowered by the gaseous blood-poisoning I have described. He goes out into the cool, clean night air, and develops a "cold" or influenza or bronchitis soon after. He is said to have caught a chill by unwisely exposing himself. He has certainly unwisely exposed himself, but it was in the theatre, and not outside it.

The case is the same with buses and trams. Many people catch "colds" through travelling *in* these vehicles, but not through travelling *on* them. I do not say that, if the right sort of germ be encountered, and the resistance lowered by bad ventilation, subsequent cold may not act in increasing susceptibility; but the cold is not the essential factor. The belief that sea-water

does not give cold means really that you may get your feet wet in pure air as much as you please without bad results. Once get a delusion firmly into the head, and even the plainest indication of nature will be misinterpreted.

It would be a pity to make any statements about the effects of cold which might lead to rashness on the part of the reader, and then to his discrediting the whole of this chapter. Therefore, before we go on to see how a man should protect his blood in the matter of air, let us note a few facts regarding cold. It is impossible to question that cold is a devitalising agency. Pasteur, as we may remember, stood a hen with its feet in cold water until its body temperature was lowered, and then found it susceptible to the bacilli of anthrax, to which the fowl is normally immune. But I believe this to hold as a principle only in the case of such cold as actually lowers the temperature of the blood; and to such most of us are never exposed in the whole course of our lives. For the rest, the effects of cold, whether applied by air or by water, depend entirely upon custom. Any one may at any time prove for himself that this is true as regards exposure of the head. Whenever a man takes off his hat on a bus or tram he is told that he will catch cold; and I never cease to marvel at the railway traveller who takes off his hard hat and puts on a travelling-cap. What he thinks this does for him I can scarcely imagine; but it is remotely possible, I suppose, that a man may so habituate his scalp to warm air—which is always poisoned by the exhalations of the scalp when he wears a cap or hat—that he might catch cold if he exposed it.¹ An old teacher of mine used to inculcate, as the rule of health, the need to “keep your feet warm, your

¹ Also it may protect his scalp from dirt, and this is worth while, so long as men otherwise clean omit to wash the head in the ordinary daily course.

head cool, your bowels open, and your mind easy." This argument as regards the feet is universally accepted, and is doubtless practically true. Five years ago, writing on this subject, I commented on the peculiar influence of the nerves of the extremities in this connection; but I had forgotten a passage in Locke's treatise on education, wherein that acute thinker attributes the susceptibility of the feet to custom alone. He was undoubtedly right. In Edinburgh, with its "bitter east and misty summer," you may see small children going about barefooted in the unfailing rain and cold, and not a penny the worse. My remark about the peculiar influence of the nerves of the extremities was nonsense, and some one should have told me so.

But it follows that the reader who may be convinced of the importance of pure air, and the fallaciousness of the common doctrine regarding cold, must reckon with the susceptibilities which his practice hitherto has engendered; and he must introduce his reforms cautiously. I believe that almost any one may acquire immunity to almost all draughts, but it is no part of the present counsel to suggest that this should be aimed at. The objection to a draught, as distinguished from still air, however cold, is that the movement of the air involves the carrying away of the heat and the moisture given off by the skin, and the continuous coming up of unheated and unmoistened air ready to take up its quantum of both. Thus the temperature of a part of the body may be much more markedly lowered by a draught of air at a given temperature than by exposure to still air that is many degrees cooler. We may regard it as part of our business, then, to avoid draughts; though, if the choice had to be made, it would be vastly safer to run the risk involved in acquiring immunity to draughts, rather than put up with foul air.

Let us consider, then, the practical indications for the daytime in the first place. Obviously the sensible man will prefer the open air to any system of ventilation when the choice is offered by day him. If he is a writer and has a garden he will write in his garden whenever he can. I dine in the garden all the summer and well into September, doubtless to the infinite amusement of my neighbours. The plan has only to be tried to be persisted in. But now as regards living-rooms—it being clearly understood that large size, though an advantage in that it makes ventilation without draughts easier, is no substitute for ventilation.

Windows should be open whenever it is possible, and in this respect the commoner form of window has an advantage over the French window, since it can be opened at the top. Amongst the most serious disadvantages of the noise and dirt of cities is their tendency to favour the closed window. If at first the opening of the window at the top is found uncomfortable, a good plan is to raise the lower sash, and support it upon a block of wood which fills the opening. The fresh air then enters in an upward direction through the vertical aperture thus formed between the two sashes. The minute quantity of air entering between the sashes of a closed window is inadequate for ventilation, is insufficient to hurt a fly on the score of draught, and its exclusion by sand-bags is utter imbecility.

The fire-place and chimney are valuable means of ventilation, and on no account should the chimney be closed when the fire is not lit. This is important in the case of bedrooms, and bedrooms without fire-places are specially dangerous to sleep in. The bed-closet familiar in Scotland is an absolute abomination. When the fire is lit the value of the chimney is much enhanced. The air travels up a chimney, when the fire is lit, at the average rate of about three feet per second, it is

said. The tendency to substitute other systems of warming is decidedly inimical to ventilation. Those rare people who really love fresh air are familiar with the stuffy, headachy atmosphere of Continental hotels which boast *chauffage centrale*, and such people do their best to avoid them. The abolition of the chimney and the fire means the abolition of the last remaining hope of ventilation in apartments not most carefully constructed with a view to this too commonly unrequired requirement.

And now as to the night-air superstition. The origin of the belief that night air is noxious—*nox*,
 The night- *noxa*, *noceo*, noise and nuisance all have
 air super- the same root—is an interesting matter
 stition for inquiry. It may doubtless be traced
 largely to the primitive fear of darkness rather than to the fear of cold. But mainly it has, I surmise, a much more definite and reasonable origin. Malaria, the disease which causes more sickness, though tuberculosis causes more deaths, than any other, was supposed, until a few years ago, to be due to bad air, as the name denotes. It was an observed fact that exposure to the night air caused this disease. The marshes with which it was connected—hence the name *paludism*—were supposed to give off their noxious miasms at night. Unquestionably he who did not expose himself to the night air escaped, as a rule, whilst he who did expose himself was struck down. But now we know that the disease is conveyed by the bite of a particular kind of mosquito, and this mosquito chooses the night as its meal-time. The air was blamed, but the mosquito was the real offender, and the air had nothing whatever to do with it, directly or indirectly.

Superstitions, however, die hard, and this one, no doubt, has a long life before it yet. We still fear the night air, and a deadly fear this is. We may note, in

passing, that all air at night is night air, and may proceed to inquire into its properties.

It is cooler than during the daytime, a fact which may be met by the use of bed-clothes. The reader who is persuaded by this chapter to ventilate his bedroom in future may thus have to use an extra blanket; but since one spends about a third of one's whole life in bed, the advantage of breathing pure instead of foul air during such a large proportion of one's time may not be thought dear at this price.

So far as composition is concerned, the few differences between night air and day air are all to the advantage of the former. It contains fewer noxious gases, since the process of putrefaction is more active during the warmth of the daytime. It contains less carbonic acid, in especial, so far as cities are concerned, since fewer fires and furnaces are burning. It contains less solid matter, since less dust is raised by traffic. And its admission is under one's own control; whereas during the daytime one may be at the mercy of other people, who "like fresh air," but are not to be mastered by their affections.

It may sometimes have struck the reader as remarkable, on the accepted theory, that cricketers should die of consumption. It must be remembered, however, that the professional cricketer may spend too much of his time in the public-house, a great resort for consumptives and tubercle bacilli; and that, if he also spends a third of his life in foul air, all the conditions for the development of consumption are supplied. Similarly it has been pointed out that Grace Darling died of consumption, "all because she slept in a chamber little bigger than herself. The glorious fresh air of the Farne Islands availed her nothing, although she breathed it all day. She slept in a badly-ventilated room."

It is thus not true to say that exposure to night air is not deadly. It kills hundreds of thousands—*but it is the night air made in their own bedrooms.* From hour to hour there accumulates in such rooms the carbonic acid given off by the sleeper's lungs, and the organic gases given off by his lungs and skin. These he reabsorbs and they poison him.

The advantages of the open window at night are general and particular; they are the same as those of breathing pure air at any other time. But it is of special interest to note the effect of the change upon the breakfast appetite in cases where this has been lacking, as is so often observed in the consumptive. The failure of appetite after the longest fast of the daily cycle is due to the gaseous poisoning of the nervous centres; and few consequences of the fresh-air treatment of consumption are more striking than the rapid return of the breakfast appetite.

The disadvantages are easily disposed of. Noise one can become accustomed to. During the process one may use cotton-wool plugs for the ears. Wedges will prevent windows from rattling, however high the wind. Draught may be avoided by placing the head of the bed out of its course, *i.e.* not between the window and the fireplace. At first the actual purity of the air may interfere with sleep, since one has been accustomed to sleep partly under the influence of carbonic acid, which is a hypnotic—mercifully so, since it soothes our last hours. One soon learns, however, to sleep notwithstanding many years' practice of this commonest of all drug habits.

It is best not to have the side of the bed against a wall, since this interferes with gaseous diffusion and increases the percentage of carbonic acid rebreathed by the sleeper.

There are certain possible means of practically creat-

ing fresh air in a living-room. One of these, at present quite inaccessible, is the exposure of liquid ^{Plants} air. This is given off in large quantities and ozone during Sir James Dewar's lectures at the Royal Institution, and may go some little way to account for the vigour and exhilaration and closeness of attention which distinguish these occasions. Or oxygen under pressure may be liberated, as is often done in the sick-room with great benefit. But, for ordinary life, flowers and plants are the only available means of supplying a room with oxygen from within. This they do, during the daylight only, by decomposing—or dissociating, to use the modern term—the carbonic acid in the air, which is their food and our poison, retaining the carbon and liberating free oxygen. Thus, during the daylight, living flowers and plants are very desirable inhabitants of a living-room—just as, from their point of view, we are desirable companions, since we produce such large quantities of the gas on which they live. At night, however, the ordinary breathing functions which plants share with us resume the upper hand in their chemistry, the dissociation of carbonic acid depending absolutely upon the assistance of sunlight; and thus at night, plants and flowers are just so many more consumers of oxygen and producers of carbonic acid. The simple rule, then, is that they are welcome during the day on all counts, in the sickroom and elsewhere, but should always be turned out at night.

A word may be said here regarding ozone. This gas is a peculiar form of oxygen, very readily destroyed by organic matter, gaseous or other, and its presence in any sample of air is therefore an index of its purity. But the gas is irrespirable, and therefore of no direct service.

An important aspect of the question of ventilation is concerned with the access of pure air to the skin

and the scalp. This most personal and intimate form of ventilation, which is too commonly ignored in discussions of the subject, will be dealt with when we consider the questions of clothing and the care of the skin and hair.

Much more important, however, is the question of the employment of the air provided, and this applies no less to bad air than to good. Infants breathe have great difficulty in breathing through their mouths, but we have none. Nevertheless, the mouth is the aperture of the alimentary canal, and the nose of the respiratory tract. The writers of Genesis were sound in their science when they said, "The Lord God formed man of the dust of the ground, and breathed *into his nostrils* the breath of life." We shall best appreciate the objections to mouth-breathing if we consider the advantages of the natural passage.

There is a device occasionally employed by delicate people and called a respirator. Its object is to filter the air and, by exposing it to the condensed moisture of the breath, to warm and moisten it. The device is a very good one, but it was anticipated and realised in an almost perfect form many millions of years ago. This natural and admirable respirator—with automatic adjustment—is the nose. The extreme tortuosity of the nasal passages renders them extraordinarily efficient as filters. Examination of the air taken from the back of the nose after its passage through this filter shows it to be entirely free from germs, and almost entirely free from the much lighter and smaller particles of dust. One of the first principles for the avoidance of respiratory infection is, therefore, to breathe through the nose. All fear and worry about infection are to be deprecated, as tending to produce that which they seek to avert, but the plan of breathing in the naturally-ordained fashion is not open to this objection and, having the approval of untold

ages, is in no need of my commendation. It is quite inadequate, however, for the filtration of fog or "smog."

The natural respirator has the further advantage of moistening and warming the air which it filters, so that the delicate respiratory passages and the lungs themselves shall be perfectly supplied. This is accomplished by the relatively lengthy journey across a mucous membrane which is richly supplied with blood-vessels—we may recall its tendency to bleed—and which is very loose in structure, so that when need arises it may become almost congested with blood. Cold air is the natural stimulus to this accumulation of blood in the nose, and thus the air is warmed. This is the explanation of the fact that the nose often tends to run slightly when we walk in cold air, the increased secretion depending upon the increased supply of blood which is necessary in order to warm the air.

Thus, unless you have something to say or swallow, your mouth should be shut. Often, no **Mouth-** doubt, it would be better shut on these oc- **breathing** casions also, but certainly it should never be open at any other time.

The tendency towards the very dangerous habit of breathing through the mouth may depend upon causes in the mouth or in the nose. A child permitted to suck rags or comforters too frequently and long, often has the shape of its jaws and palate modified, so that the lips close only with an effort. People whose mouths have been thus distorted must learn to make this effort—which, after a time, will be no longer required. The same remark applies to people who have lost their back teeth and thrown the whole work of mastication upon the front teeth, which have consequently become inclined outwards and so interfere with the normal apposition of the lips.

Most commonly, however, mouth-breathing is a

necessary resort because the nose is obstructed. The causes are many: polypus, adenoids, and so forth. No one should permit himself to have either nostril so obstructed, still less to permit such obstruction in the case of any child for whom he is responsible. Lesser degrees of obstruction are due to chronic nasal catarrh, and the wonder is that the noses of city dwellers remain as clear as they do, considering the amount of dust and smoke-particles which are constantly being trapped in them.

This respirator has the further advantage of a sensitive surface—the olfactory or smelling membrane—which warns us as to offensive gases or particles in the air. The warning is to be utilised by departure from the source of offence, or its suppression; *not* by holding the nose and breathing through the mouth. If such things must be breathed, at least let them be filtered as far as possible.

I have devoted by no means excessive space to this initial subject, the vital importance of which cannot be over-estimated. It is relevant during
Conclusion twenty-four hours of every day we live, affecting the very composition of the blood during every moment of our lives. It has the great advantage and the great disadvantage of not arousing the interest of the hypochondriac and the man who fusses about his health. This is an advantage because the subject can at least be discussed and its importance insisted upon without the writer having any fear that he is encouraging hypochondria and valetudinarianism: but it is a disadvantage because the preacher is not listened to as he is whenever he directs people's attention to some part of their own person. It gives self-observation nothing to feed upon. Thus, at any time, you may attend meetings in which the most trivial matters of diet are being discussed as if the destiny of mankind depended upon them—in an atmos-

phere which involves the blood-poisoning of all present and would neutralise the value of any diet that common sense, healthy appetite, or the food-faddist can conceive.

Reading over this chapter, with its priceless advice, none the less true or treasurable because it is trite, I am reminded of the admirable story of Naaman, which teaches us once again how little human nature has changed in so many ages. The Syrian captain expected to have splendid phrases spoken over him, and the site of his disease dramatically struck by the prophetic hand, or to have some great task appointed: "And his servants came near, and spake unto him, and said, My father, if the prophet had bid thee do some great thing, wouldst thou not have done it? how much rather then, when he saith to thee, Wash, and be clean?"

The remedy was too simple: it made no appeal to the love of magic and the strange. He wanted something that he could never have thought of himself: and he was told to wash and be clean. The case will be the same with most of my readers. They have or fear consumption, perhaps, or some other malady: they suffer or fear to suffer from symptoms like "that tired feeling" or lack of energy or appetite. They do not want to be told about fresh air—they know all about that. It makes no appeal to their love of the miraculous, and it is far from new. They thought that a young writer like myself would be "up-to-date" and have something fresh to say, instead of these stale things about fresh air.

Let such a reader be persuaded that he is utterly wrong. He has a "weak chest," perhaps, and thought to hear about the newest tuberculin, not about the need of air. But the action of air (and of light, to which the next chapter is devoted) is not one whit less magical or miraculous than any of the achievements of

bacteriology. Pasteur, the founder of bacteriology, said that "tout est miracle"—a highly significant saying for such a wonder-worker as he was. You are like Naaman: you would take a lot of trouble to obtain some wonderful preventive or cure, and would pay a good price for pure air if it were corked up in a bottle labelled "elixir of life," which it certainly is: but to be told "Go and wash in Jordan"—this is too commonplace altogether. Thus I do not expect to be thanked for this chapter, nor for others like it, any more than the people thanked Dr. Ox and his servant Ygène in Jules Verne's excellent parable, when they found out that air, merely air, was their secret. But I should have earned the reader's thanks none the less.

THE NEED OF LIGHT

WE are all the children of light. This is true of every living thing, for all life is the child of light. The obvious utility of light and of vision is not **Life and** concerned in this statement, nor does it **light** follow that ceaseless stimulation of the eyes is necessary or desirable. Nor, again, does it follow that the sun may not destroy his own children. The question of protection from the sun in his strength will be considered in the discussion of clothing. The point to be made in this brief chapter is that we cannot do without the sun, and that none of our artificial substitutes can replace daylight for general purposes, though they may do so for purposes of vision. As has been said, the electric arc may cause sunburn, but it cannot replace the sun.

Though light or, in more general terms, radiant energy, is necessary for all life, yet direct sunlight is highly inimical to the low forms of life which are inimical to our own. Many bacteriological experiments show that tubercle bacilli, for instance, are rapidly killed by exposure to direct sunlight, and, as everyone knows, the observation has been applied in the Finsen light treatment of skin-tuberculosis, which we call lupus. The admission of abundant light, then, to all places inhabited by mankind, indoors and out of doors, is highly desirable, whether or not its direct incidence upon their human occupants be beneficial, as sometimes it is not. The greenhouse principle is not suited for human uses, and I do not suggest that light should be admitted without limit, through glass, to closed rooms. Air must freely be admitted also. It is worth noting that the most markedly antiseptic rays of radiant energy are the ultra-violet rays, which are invisible to the human eye, though they are registered by the photographic plate and are visible to the eyes

of ants. Now glass is opaque to these rays, which have little heating-power, and should therefore be on every account welcome within our living-rooms. It is better, then, to admit light through open windows rather than through glass.

Quite apart from its enmity to our enemies, light should be welcomed by us as the first, best, and safest

Light the of stimulants and tonics, when stimulation
best tonic is desirable. In other words, it should be excluded from the sleeping-room, but freely admitted when we are awake. Artificial illumination has not this stimulant power, whilst the practical impossibility of making it diffused involves a strain upon the eyes which diffuse daylight does not cause.

The precise experiments of Platen enable us to express in definite chemical terms the stimulating effect of light. He found, in the case of dogs, that they absorbed sixteen per cent. less oxygen when their eyes were bandaged than when the light was allowed access to them. The utilisation of this oxygen of course involves the consumption of more food, which is burnt up by it, as well as more work for the excretory organs. Thus there may well be occasions when the exclusion of light is desirable; but these experiments clearly show its value for the healthy man who desires to live fully.

Not only does the absorption of light—by the skin as well as the eyes—make for the increase of vital energy, which is indeed none other than transformed solar energy, but it also strengthens the bodily defences against injury and disease. It serves the manufacture of those preventive and remedial substances which the body must constantly produce if it is to thrive. The thing is as magical as everything else, if only we had the intellectual light to see it. The experiments of Clayton and Flammarion, showing the value of light for vegetable growth, are none the less

marvellous because the results are what might have been expected; unless we are to declare that our expectation or lack of expectation is the criterion of the marvellous.

This chapter and the last introduce the subject of the furniture of the living-room, and to this I may devote a word or two. It is a lamentable **Light in the** spectacle, in the houses not of the poor living-room alone, to observe the accumulation of useless furniture in rooms already dangerously small. Every piece of furniture directly reduces the size of a room and its air-containing capacity. It is also a depository for dust; and, unless it has a use, its proper place is the dust-bin. Similarly hangings and curtains, besides interfering with ventilation, interfere with illumination. Apart from the fact that they are too frequently eyesores, they are objectionable on purely practical grounds. The relatively bare and empty room of which modern hygiene approves looks unfurnished to the eye at first, but fortunately eyes are educable, and before long we come to wonder at our neighbours' habit of choking themselves up with lumber and covering every possible source of life-giving air and light with hangings. By all means have the thickest—so-called “photographic”—blinds for bedrooms, since light interferes with sleep, and let them be wide and long; but curtains in bedrooms especially are an abomination, whether over doors or windows. The tendency to over-furnish is a craze, and involves making many women nothing but slaves to their useless and worse than useless possessions. There are other ways of demonstrating or simulating affluence, and this one should be put an end to. There are many cases where chronic bronchitis and asthma and nasal catarrh can be abolished by the abolition of curtains and hangings and even carpets, the chief functions of which are to accumulate noxious dust, occupy space which might be

occupied by air, exclude both air and light, and interfere with the circulation of the one and absorb much of the other. Our forefathers were worse than we, and would look with as great astonishment on our present practices as many will now be inclined to feel when they see how a house should really be furnished. Their fourpost beds, with all their apparatus of hangings and curtains, not to mention feather bedding, are utterly condemned by the common sense of this generation, but we have not gone far enough yet. We have much to learn from the Japanese, whose notions of house-furnishing may serve as a model to us, alike on the score of art and on the score of hygiene.

The question of light directly bears upon the treatment of walls. The darker the walls of a room, and the more covered they are with dark furniture and hangings, the more intense does artificial illumination require to be, since so much light is absorbed and so little reflected from the sides of the room. The use of light-coloured walls is therefore to be recommended on the score of economy alone. It is also to be commended as adding to the light of the room in daylight—a most important point in smoke-darkened cities. Again, in permitting reduction of the local intensity of the artificial lighting of the room it reduces that strain upon the eyes to which so many troubles, not only of the eyes, may be traced. The ideal is unrealisable, but the lighter the walls of the room the more nearly it can be approached.

A light wall-paper soon becomes dirty; therefore the proper covering is not paper but a smooth and washable paint or distemper. I do not know why any one uses wall-paper nowadays, but if for some unknown reason it is employed, let it at least be patternless. The strain imposed by modern civilisation upon the eye, an organ evolved and adapted for use at long range, is now only

The treatment of walls

beginning to be appreciated, and its effects are far-reaching, involving much more than the eye itself. It is enough to be reading and writing many hours in the day without having patterns to decipher on our walls, and not a single space in the whole room upon which the eye can rest *and rest*. From the point of view of art and the education of the æsthetic taste of children, these awful wall-papers, with their repeated roses and baskets of hideous flowers, are without any excuse. In a bedroom, where someone may some day lie ill, they are a nightmare. Whatever the eye may tolerate in health, at least the eye of the invalid should always have peace from these torments, and should have, for choice, I am inclined to think, a pale green surface to rest upon. Cream or "pink ivory" and green I recommend as the colours of walls; and green especially for bedrooms, where brilliance of light is of less importance. I take it that the prevailing colour of the vegetable world has determined, in accordance with the general principles of the action of environment, the particular adaptation between green and the animal eye. It is probably the result of sound observation that card-tables and billiard tables are covered with green cloth; and the reader who will paint the walls of his bedroom a pale green and furnish it in accordance with the principles I have laid down will be surprised to find how exquisite and restful a result can be obtained, and at how small a cost. If, then, after a few weeks, he has occasion to sleep in a strange bedroom, he will not fail to appreciate his own.

I am sorry if the reader expected a dissertation on light-baths and all the devices which belong to this category. Such might have been made interesting, no doubt, but not useful. The Finsen light treatment for lupus can scarcely be too highly praised, and there are few medical subjects more susceptible of attractive discussion; but if I so spent the space which

I might devote to a discussion of the much less interesting and striking means by which to avoid lupus altogether, I should be abusing an opportunity. Now fresh air and sunlight are the deadliest enemies of the tubercle bacillus, and of every other noxious microbe already or yet to be discovered. They are directly poisonous to microbes and directly life-giving to man. Surely, then, it is more decent that we should discuss the conditions of air and light, in which if we live, we may laugh at almost all microbes, rather than that we should discuss the nature of lupus and its modern treatment. The terrible fact about the greater part of disease, certainly the overwhelming proportion of disease in temperate regions, is that it should never have happened.

"If of all words of tongue or pen,
The saddest are, 'It might have been.'
More sad are these we daily see,
'It is, but it hadn't ought to be.'"¹

In a world that has enough and to spare of necessary evils, the unnecessary, which are a thousand times more numerous, are absolutely intolerable, and my purpose here is to show how some of these may be avoided. Discussion in a book will not cure lupus; the doctor and his apparatus are necessary; but just as surely as the diagnosis and treatment of disease without actual examination and observation of the patient is an impossible quackery, so surely the prevention of disease can be achieved by books. This kind of medical practice does not win the gratitude of the other, but it is vastly more efficacious and useful. The reader who wants a discussion of diseases and their treatment must refer to dictionaries of medicine, and precious little good they will do him. But the reader who will attend to the elementary laws of life, regarding such

¹ Bret Harte.

things as air and light, which are necessary to all life whatsoever, can afford not to care, so far as his own person is concerned, whether consumption and lupus can be cured or not. They will not come near him.

An appeal may be made, however, to the individual reader, regarding the smoke of cities, with its products of fog or "smog." No advice of mine will enable the individual to avert these evils from himself. But since nothing will avail but the formation of public opinion, it may be hoped that something may here be done towards this end. We take the coal made by the sunlight of past ages and use it to obscure the sunlight of the present. The practice is most costly, it is dirty, it interferes with ventilation—since it tempts the housewife, solicitous of her clean white curtains, to keep windows closed—it devitalises our noses and air-passages, and permanently stains the lungs of every city dweller. Smoke is not antiseptic, but the obscurer of the first, cheapest, and best antiseptic, which is sunlight. There is not an extenuating circumstance in its favour, and the indictment against it is without limit. When are we going to take serious and concerted action against this perennial destruction of daylight?

THE NEED OF CLOTHES

THIS chapter is advisedly entitled "The Need of Clothes," since it is clothes as a need that we are solely concerned with. Nevertheless, a certain historical fact is by no means only historical, and will very certainly insure that the principles and arguments that are to follow here do not meet universal acceptance. This historical fact is that, as Carlyle hints at the beginning of "Sartor Resartus," and Spencer at the beginning of his "Education," the origin of clothes was not need as we understand it, certainly not the need for warmth or protection, but the need for self-assertion and decoration. With clothes as decorative we must here assume that we have no concern; but that this is an assumption only, the history of fashion abundantly proves. When, therefore, it is possible to add the æsthetic to the hygienic argument, this must be done.

After the invention of clothes for purposes of decoration came the discovery of their value as means of protection—the question we are about to discuss—and lastly came the wholly artificial and conventional sense of their need for decency. With this we have no appreciable concern at all, since, fortunately, there is hardly any hygienic requirement or suggestion which conflicts with any modern criterion of the decent.

First, then, what is the hygienic or protective function of clothes?

The following are the items: the retention of warmth, the avoidance of dirt, protection from direct sunlight, and the protection of ill-protected structures, such as the feet, from mechanical injury.

Considering first the retention of warmth, the reader Clothes and need scarcely be reminded that, except for warmth fires and hot bottles and the incidence of sunlight, all his heat is produced by himself. No clothes produce any heat whatever. The standard

clothing material, which wool represents, is used in the form of flannel to prevent ice from melting when it is exposed to temperatures higher than its own. We thus are strictly correct when we speak of putting on clothes to "keep us warm." They create no heat, but merely retain it.

This elementary fact involves what is constantly forgotten—a necessary relation between food and clothing. Since clothing serves to retain the heat which is created by the burning of the food or fuel which we take in, it follows that, other things being equal, the more fuel taken, the more rapidly can heat be lost from the body without lowering its temperature, and therefore the less clothing—that is, obstruction to the outflow of the heat produced—is necessary. On the other hand, if abundant means are provided for retarding the outflow of heat—that is, if we clothe ourselves heavily—then so much less heat will require to be made, so much less food will require to be consumed. Thus I offer it as a speculation which observation may prove true, that a very considerable amount of the violent differences which now agitate physiologists, "dieteticians," food reformers, food faddists, *et hoc genus omne*, scientific and unscientific, depends upon this question of clothing. I fancy it may be found that, *in general*, the people who live on an exceedingly spare diet clothe themselves very warmly, and so make a little food go a long way. We are really only at the beginning of this question, and I cannot attempt to discuss it here fully, but it is well to note its bearing on questions of economy. It is vastly cheaper to clothe warmly than to have to consume every day an extra amount of food because one clothes lightly. What, however, should be the balance between these two things, whether it varies for different people, whether the best results can be got out of the bodily machine with much fuel and rapid loss of

heat or with little fuel and slow loss of heat—these are questions which I cannot answer, for the excellent reason that they have not yet even been asked. I am inclined to think, however, that just as warm clothing and less food means monetary economy, so also it means vital economy, and much labour-saving for the digestive and excretory organs.

We are to consider clothes primarily as means for preventing the outflow of heat, and the first of the facts usually forgotten is that the warmth, as we call it, of a given material or garment is not ascertained when the material is named. There is much absurd superstition about wool, and indeed about the mere source of clothing material in general. It is quite certain that the texture is no less important, and it is even more certain that tightness and looseness are more important still. So important is it that clothing should be loose that we must devote special study to this single point.

The body was not made for clothes, but clothes for the body. There is something unnatural, one may say, about the application of any kind of garment to the body, the movements of which, as a whole, and the movements of its parts amongst themselves are, so to say, assumed by nature to be absolutely unrestricted by any outside agent other than the pressure of the atmosphere. The moment any garment is applied, the risk of unnatural pressure is involved. The hard hat squeezes the arteries of the scalp, starves it of blood, and causes baldness; the pressure of the boot causes corns and deforms the joint of the great toe in every civilised person; the pressure of the garter interferes with the return of blood upwards through the surface veins of the leg, and helps to make them varicose; the pressure of anything upon the chest interferes with the expansion of the lungs, helps the blood to stagnate in them, and

predisposes to consumption; the pressure of anything around the waist, such as the corset, interferes with the movements of the wall of the abdomen and of the bowel, and thus causes constipation and many other evils; continuous pressure upon any part of the skin will kill it and produce an ulcer; intermittent pressure causes such forms of overgrowth as corns. There is no exception whatever to the rule that from top to toe all pressure is undesirable. Since it cannot be absolutely avoided, in consequence of the weight of clothes, it must be minimised, it must be evenly distributed, it must be allotted to those parts, such as the shoulders, which are best able to bear it. It is traditionally upon the shoulders that a man bears his burdens, and even the burden of clothing should, as far as possible, be borne there too.

Not only should clothing be loose on these general grounds as regards surface pressure and interference with movement, but it should also be loose, because, if sufficient outside pressure is applied to a limb, say a foot or a hand, the blood simply cannot enter it from within. The incautious attendant, too tightly bandaging a limb for some time, will cause its death from starvation. On the other hand, if blood be imperatively needed at the centre, the limbs may be intentionally starved by tight bandages for a time in order that the vital parts, brain and heart, may be kept going. If a glove or a boot be very tight, the foot or hand is starved, and since these parts make practically no heat for themselves, but depend for the maintenance of their temperature upon the blood, warmed by the central fires, the limb in such cases must become cold. A very large number of people who suffer from cold feet are guilty of the stupidity of systematically excluding from them, by means of tight footwear, the only thing that can keep them warm from within. The stretching out of a tightly-

cased foot to the fire may have, on occasions, attractions which scarcely come within the purview of the hygienist; but it is pure folly so far as he is obviously concerned. On the whole, considering man's adoption of the erect attitude, prejudicing the circulation in the feet, and considering his footwear and the conditions under which he expects his feet to live and move, perhaps the endurance of this part of the human body is noteworthy amongst many noteworthy facts.

There is yet another reason why clothing should be loose—on account of the *retention* of warmth, quite apart from any question of interference with the circulation, and therefore with its *distribution*. A given amount of a given material and texture is warmer as a loose garment than as a tight one, simply because it imprisons, as a loose garment, a certain amount of air, and air is relatively a very bad conductor of heat, and therefore “warm,” just as clothes are “warm.” This is one reason why there is something to be said for clothing ourselves in more layers than one. We thus imprison more layers than one of air—broken layers, no doubt, but none the less valuable, so long as the air is imprisoned in some degree. Indeed, other things being equal, the warmest clothing will be air-tight clothing, but it is hardly necessary to say that the imprisonment of the air by clothing for purposes of warmth must only be partial and imperfect. Let us observe the golden mean, and whilst, on the one hand, we clothe ourselves with air, let us insure, on the other hand, that the air is ventilated.

Having agreed that whatever else our clothing is or is not, it must be loose, we may proceed to the **The flannel** question of its material. Here, of course, **fallacy** there is no question as to the value of wool or flannel for us, just as for the creatures from whom we steal it. Yet though it might be supposed that no

one who had ever seen a sheep could question the importance of texture in this matter, we are all inclined to fancy that material is everything. As long as a garment is made of wool, it may be tight, it may be made into a dense, inflexible, non-absorbent texture, so that it will float almost indefinitely when a piece of it is placed in a bath of water, and yet we think that all is well because it is wool, though nothing short of microscopic study of its fibres will suffice to discover any relation between this substance and the exquisitely light, warm, absorbent, ventilated coat of the sheep.

Now it is doubtless true that the sheep has the advantage in that its clothing grows out of its skin, and besides needing neither safety-pins nor buttons, requires no continuity of structure in order to be held together. The sheep's advantage will be realised if we consider the case of a man wearing a sheepskin coat. He is wearing not only the sheep's clothing, but also the sheep's skin, which he puts on outside his own. The sheep "scores." Nevertheless, there is no reason why we should weave wool into dense flannel textures of the kind which the scullerymaid employs, or used to employ, for cleaning a sink.

For there arises another difficulty from the fact that we employ clothing at all. It is that, whilst interfering with the output of heat from the skin, as we desire, we also interfere with the disposal of the effete matters discharged by the skin, as is by no means to be desired. Clothing must therefore be absorbent, or, at the very least, the layer next the skin must be absorbent, and the more necessary is this the more complete and close the clothing; the less necessary the nearer it approaches the natural state, as in the garb of an athlete. The skin can perfectly well do without any absorbent arrangement at all, as the face suffices to

prove, but in so far as we clothe it we must compensate for the disadvantages involved in all clothing. Now the whole virtue of wool or flannel next the skin, as against any other material or as against their use in an outer layer, is that they are supposed to be absorbent. Directly we employ a texture which, however unquestionable its claim to the title of "all wool," is non-absorbent, the virtue has gone out of it except on the score, insufficient in itself, of warmth. Thus the non-absorbent "chest-protector" is really a chest-weakener by its interference with the functions of the skin of the chest. Thus again, there is no reason in the world why people in whom wool is apt to cause a rash, or people who like to be lightly clad, should take any notice whatever of the old doctrine, provided that the non-woollen material which they wear next their skin is woven into an absorbent form. If the reader is inclined to question whether the texture can really determine absorbent power to the extent suggested, the point may be illustrated by the case of the surgeon and his cotton wool. Different makes of cotton wool, though all consisting of pure cotton, vary enormously in absorbent power. A cheap cotton wool wrapped in gauze and used as a swab by the surgeon will seriously handicap him as compared with a better make, which sucks up everything as quickly as a sponge.

It is now possible to obtain absorbent underclothing made of silk, linen, cotton, and other materials, and produced by many competing firms, which, so far as absorbent power is concerned, has all the virtues of any woollen garment, and none of the disadvantages which attach to wool in the case of many people, and for many climates.

Wool, of course, when made of a proper texture, retains its value on the score of warmth. But we must remind ourselves that man, this amazing and unique animal, lives in all the external temperatures

which his planet affords, hot as well as cold, and the warmth which is a virtue in wool in the temperate zone is a final objection to it in parts of the world where the average external temperature is higher than that of the human body, and where the problem is to keep cool.

None too much space has been allotted to this question of absorption and to the refutation of the flannel fallacy. We have to remember that the average man disposes of about fifty ounces of water by his skin every day, together with various gases and a good deal of oil. This being so, the introduction of thoroughly absorbent materials which are not made of wool really involves a very substantial improvement in the clothing of civilised man. It enables him to clothe himself in something not too ludicrously unlike the admirably ventilated clothing of the lower animals—wool, fur, and feathers. Also, it enables him to throw the duty of preserving warmth upon his outer clothing, and to devote his underclothing to the business of protecting the skin from dirt. Light, loose, cool, absorbent underclothing best serves this purpose, not least because it can be so readily and frequently washed. Those who compare our present-day clothing with that of our ancestors to our disadvantage can be very little aware of the dirt which they regarded as normal, and of the services to cleanliness and the predilections of the nose involved in the introduction of linen, and still more, of cotton the cheap, for the purposes of underclothing.

And here may be conveniently noted a protest of the strongest kind against the occasional attempts made nowadays to decry the production of cheap and undurable clothing. By all means let us have clothes which can survive a visit to the laundry—a question more of the methods of the laundry than of the material of the clothes. But let us not suppose that the wonderful

Clothes
should not
be durable

garments of old, which were handed down from generation to generation (having early become impregnated with as much dirt as they were capable of holding), are to be regretted to-day. It is safe to lay down the proposition that, other things being equal, clothing cannot last too short a time. It is what cometh out of a man that defileth, and no material thing that we expose to our presence, much less our touch, is any better for it. It is not yet to be hoped, I suppose, that a decent standard of cleanliness will be adopted as regards bedclothing—blankets and mattresses in especial—even though that little city of little lives, the feather bed, has mercifully gone out of fashion; but as regards our personal clothing, let us be assured beyond all possible question the ideal is that of the Japanese handkerchief, here to-day then gone for ever. Recent investigation as to many forms of disease is tending to show that more attention than ever hitherto must be paid to the clothing we cover ourselves with by night and day, and to the rich and varied forms of humble life with which, I need hardly say, it superabounds. The discoveries regarding the conveyance of microbes, such as that of malaria by the mosquito, are now being rapidly extended, and are beginning to teach us how many friends, hosts, and vehicles of microbes are to be found, if they are carefully enough looked for, in our closest neighbourhood; and in the light of these facts nothing more ridiculous than the cry for a return to the splendid and durable old garments of the good old days can be imagined. We forget what the death-rate was in the good old days. Cheap and nasty does not apply to clothes at all, and ideally they should be literally ephemeral, lasting for one day only.

In order to point this moral, one may refer to the Japanese handkerchief. Here is an article which performs its function perfectly. It is beautiful, cheap,

light, and of small bulk. When done with, it goes into the fire, and can hurt no one. Our handkerchiefs, however, when dirty are sent to the laundry to be cleaned. This means, of course, exposing other people to what we are well rid of. Amongst the contents of these handkerchiefs, in millions of cases every day, are such germs as those of tuberculosis, pneumonia, diphtheria, influenza, bronchitis, the common cold, and a good many others besides. As to the actuality of the infection of workers in laundries in this fashion there is now no question, and I hope the point may soon engage the attention of the law courts. The best place for the microbes of disease from our point of view is fire, and that is why the Japanese pocket-handkerchief may be held up as the model towards which we should be wise in approximating, in regard to clothing in general, as closely as possible. It may be added, as regards the question of beauty, that there is no relation whatever between expensiveness and durability, on the one hand, and beauty and fitness for the adornment of the human person on the other hand.

Is it not somewhat remarkable that the man who would be horrified at the idea of not changing his underclothing at least once a week should be content practically to ignore altogether the question of changing or cleaning his outer clothing? The ideal of a new suit once a week doubtless sounds absurd, but any athletic reader is well aware that at least such a garment as trousers can be made in materials which stand washing, as of course all trousers should really be washed.

One other general matter must here be referred to—disposed of it cannot be. The reader who desires detailed and dogmatic advice may reprove me for not stating definitely what weight of clothing, for instance, a man should wear, and how he should alter it at different times

The edu-
cation of
the skin

of the year, if at all. Hitherto it has been merely hinted in an earlier chapter that many people make themselves susceptible to cold by refusing, as a rule, to expose themselves to it; yet, on the other hand, in this chapter it has been hinted that warmer clothing involves economy in food, and probably also in the work of the excretory organs. If only it were possible to say that a man should wear as little clothing as he possibly can, or, on the other hand, that a man should be warmly clad up to the limits of comfort, the foolish reader might be grateful, and doubtless attention would be drawn to the opinion. The wise reader would rightly write me down as a fool. Here, as elsewhere, we must observe the golden mean, and we must also observe the facts already insisted upon, of the unique adaptability of man, which is such that you, for instance, may go about cheerily in winter clad in a fashion which would almost certainly expose your neighbour to pneumonia.

This adaptability of man does not extend to his own bodily temperature. That is the same in the tropics or in the polar regions, in the negro or the Esquimaux, in summer and in winter. The adaptability shows itself in the fact that under all these varying conditions, to which may be added immense variations as regards the warmth of his clothing, even in a given place, he is able to maintain his temperature at a constant level by an automatic mechanism, of which the skin is the actual instrument, though the brain is the worker behind it. It is not well, then, even though we call in clothing to help us to maintain our temperature, that we should permit the skin to lose its wonderful function in this respect—as most of us do. The principle of what, according to the point of view, we may call vital economy or vital laziness, insures that no organ of the body will do its work if that work is done for it. Dose your stomach with

pepsin and it will cease to produce pepsin—this is one instance of an infinite number. Undoubtedly the mind of man has devised ways of saving labour on the part of his body—cooking, for instance. But this must not be carried to the point at which its acquired incapacity will injure the body, and undoubtedly many of us do expose ourselves to grave injury by mal-education of the skin.

In the first place, we little realise our extraordinary capacity for maintaining our temperature and for adapting ourselves to different external conditions in this respect. Darwin tells us that, when in Terra del Fuego, his own party, well clothed and sitting by the fire, were grateful for its warmth; whilst the naked natives, who were farther from the fire, were “streaming with perspiration at undergoing such a roasting.” The reader will say that this contrast of need was a matter of race, but what about the exposure of the chest by women of our own civilisation in the evening? What about the “pneumonia blouses,” which, difficult to defend as they are, one cannot dogmatically assert to cause pneumonia? The skin, however, must be educated to these capacities. As regards teeth, we can afford, *perhaps*, to let their education go, trusting in a continuous supply of cooks and dentists. But we cannot do without this function of the skin unless we are prepared to spend the rest of our lives in a physiological chamber filled with air of constant temperature.

This is not to defend the hardening process, by which so many children are, or used to be, hardened into the stiffness of death. But it is to defend the ideal which was so injudiciously striven for. Here, again, we are faced with the golden mean, so easy to talk about, so easy to approve, so desperately difficult to attain in almost every sphere of life.

Continuing the general discussion of clothing, to

which this chapter is confined, we must consider the question of clothing in hot weather. The chief function of clothing, from the point of view of physiology, being to retain the animal heat, we must realise that when the external temperature is hotter than our own, all the practical relations of clothing are reversed. Its sole physiological function now becomes that of protecting the skin from the sun and from dirt. There thus arises a real conflict between the demands of the sense of decency and the need to keep cool. This conflict, in the case of women's lower clothing, may be serious. Men are more fortunate in this regard, but women "score" as regards the clothing of the chest.

First of all, then, in hot weather the unexceptioned principle that clothing must be loose is peculiarly applicable. Anything that interferes with cutaneous ventilation is a source of discomfort and of injury to health. If the skin is kept scrupulously clean, the question of the *odor humanus* does not arise. It is said that the *odor humanus* does not exist in a Japanese crowd. Otherwise, however, the necessity of ventilation is more urgent than ever. We note in passing that the best ventilating material is also the most absorbent.

As regards protection from the sun, the simple principle is that sunstroke is due to the action of sunlight—or possibly certain invisible solar rays—upon the higher portions of the nervous system—the brain and spinal cord. The possessor of abundant hair is already protected in some degree, so far as the brain is concerned. The ordinary clothing protects the lower part of the spinal cord. The back of the neck, however, constitutes the weakest point, protected as it is neither by hair, hat nor clothing, and doubtless mild cases of sunstroke do arise in temperate climes from the careless exposure of the spinal cord at this level. The appropriate means of prevention by hat-brim or hand-

kerchief are too obvious to be detailed. It may be added in passing—since the subject of food can never be divorced from that of clothing—that since the physiological problem in warm weather is the diametrical opposite of the problem in cold weather, viz. not to keep the temperature up, but to keep it down, we shall do well to begin at the beginning by diminishing the supply of food or fuel. The body is perfectly aware of this fact, and indicates it by a diminution of appetite which not one man in a hundred has the sense to appreciate or respect.

CLOTHING IN DETAIL

THE natural clothing of the head is the hair, and the general rule—doubtless with one definite exception—should be that no other clothing is necessary. The hygienic function of clothing of the head should not have any place—except as regards direct sunlight—so far as the head is concerned. The question of decoration is, of course, distinct; and, in point of fact, it is decoration that both sexes, and not women only, are chiefly concerned with in regard to the clothing of the head. The only inconvenience women pay for this desire is in the matters of time and trouble, anxiety, and perhaps expense. The principles of decoration which they follow are consciously or unconsciously made compatible with the preservation of the hair itself, which is, of course, vastly superior in decorative value to any head-gear.

It may quite dogmatically be said here that there is no adequate physiological or evolutionary reason to account for the contrast in durability between the hair of men and the hair of women; that is to say, no inherent reason. The hair of the scalp is not a sex character, or, if it be, it is a character common to both sexes. The scalp is merely human, not male or female. It is the same in structure and function in both sexes. So also is its blood-supply. Indeed, if any evolutionary factor be called in here, it might be expected that, the hair being a means of sex attraction, natural selection would have arranged for its greater durability in men than in women, since the individual man retains his possible racial importance to a very much later age—two, three, or more decades—than the individual woman. It is then to personal habit and not to anything inherent that we must attribute the contrast already alluded to.

To the unaccustomed eye, if not to the artist's eye

at any time, the uncovered or merely veil-covered hair of, say, the Genoese girl, is more beautiful than any hat or bonnet can possibly make it. The ordinary feminine hat, however, is hygienically innocent, as the duration of women's hair goes to prove. Being attached to the hair, and not to the head, the woman's hat is often her one article of clothing which conforms to the fundamental requirement that all clothing should be loose. It does not appreciably raise the temperature of the scalp, and usually has the virtue of light weight.

The head covering of men, whatever its form, has nothing good to be said for it. If the delicate skin of the face, mostly unprotected by hair, extremely rich in nerves and blood-vessels, is none the worse for complete exposure, there is no reason to suppose that the thick and protected skin of the scalp is in any greater need of artificial covering, except only in so far as its exposure to direct sunlight may affect the underlying brain. Even when the hair has been destroyed by the hat, combined with that amazing lack of cleanliness which, as regards the scalp, is the general rule for both sexes, a hat is not really necessary except in order to hide the loss of hair. Emphasis must be laid on the phrase, "direct sunlight," since it is this, and not heat as such, that head-covering really protects from. On the contrary, so far as heat is concerned, male head-covering in general raises the temperature of the scalp, increases the amount of impure venous blood in it, and, therefore, in the coverings of the brain. The head-gear which protects from sunstroke may therefore promote heat-stroke.

Experiments have been made which show how markedly the various kinds of male head-gear, both hats and caps, raise the temperature of the scalp. They do this, in a word, by interfering with its ventilation. Now it is a cardinal principle that the head should be

kept cool. Furthermore, the gaseous and other products of the scalp are poisonous to it; the products of the life of all living things, without exception, are poisonous to them. The nearest approach to an exception is found in the case of the yeast plant and the alcohol which it produces; yet even here the plant is killed when the alcohol reaches a certain small proportion. Thus the ordinary conditions of the male scalp are as follows:—It is usually dirty; the hair it carries is a trap or filter for dust, dirt, and microbes; it is rich in oily secretion really designed for the health of the hair, but admirably fitted for the nourishment and culture of microbes. Take the average man at any given moment, and, whilst the rest of his body is moderately clean, his scalp is simply filthy. This scalp, then, is covered for a considerable proportion of every day with artificial clothing, notwithstanding the fact that it is the only part of the human body which retains the natural clothing, viz. hair. This artificial and essentially superfluous garment, then, overheats the dirty scalp by preventing radiation and evaporation. The heat thus accumulated causes over-secretion, and is, of course, highly favourable to microbic growth. In the majority of cases in cities the fundamental principle that clothing should be loose is infringed, and infringed in the worst possible site—namely, one in which there is a rigid underlying tissue—bone—which cannot yield or adapt itself to the external constriction. The pressure exerted by the rim of the hat upon the blood-vessels affects both the veins and the arteries. Interfering with the arterial supply, it diminishes the flow of pure blood with its oxygen, its microbe-destroying substances, and its food. Veins, however, are always more readily constricted than arteries, being thinner walled, usually more superficial, and having less pressure of fluid within them. Thus the venous return from the scalp is especially interfered with, with the

consequent chronic congestion of deteriorated and poisonous blood. Add to this the fact that, owing to the structure of the skull and scalp, and their general "tightness," the circulation is in any case somewhat difficult—especially, it would seem, through that part of the crown and the top of the head at each side, at some distance from the middle line, where baldness most commonly begins. Is it then surprising that men commonly lose their hair? Is it not surprising that any of them retain it?

If a writer is to be practical, he must compromise. And it is presumably useless to declare that the hard-rimmed hat of any kind whatever is an offensive absurdity, serving solely the function of decoration, and thereby almost certainly destroying the natural and most decorative decoration, which is the hair. There is no good word to be said for this garment. If, however, it is to be employed, the rim must be soft and flexible, as in the Panama hat—not the strawboater; the total weight must be as small as possible; there must be ventilation, though this will in any case be imperfect; the hat must be worn as little as possible; and the wearer must abandon the principle that the part of the body which is most exposed to dirt and the most rapid accumulator of it is the one part which need only casually be cleaned.

If we are to wear anything upon our heads at all, the cap is preferable, but of course it should be a washable cap, and not the excessively dirty thing with which we are commonly contented.

Any notion as to the necessity of head-gear on the score of protection from cold is obviously absurd and baseless. In any case the normal head is protected from cold as is no other part of the body. Even if it were not, the example of the face should suffice to correct this delusion. You may ride hatless in a motor car or on a motor bus, in any kind of weather, wet or

fine, except direct blazing sunlight, without any evil consequences. This, of course, is not for a moment to assert that any part of the body, or any of its functions, can throw off in a day the effects of years of mal-education, but any reader can very quickly inculcate sound habits in this respect, and though there can be little doubt as to the inheritance of a tendency to baldness in many cases, there can be no question that the hair will last longer under a clean and rational *régime* than otherwise.

It is, of course, as Darwin showed a generation ago, a natural attribute of the male animal, man included, that he desires to appear conspicuous, imposing, remarkable, in the presence of the other sex. It is hoped that the head-gear will attract attention to the most interesting and characteristic part of the body, which is the head. In a word, man really wears his head-gear in order to enhance his face, as woman does; with the added motive, in many cases, of increasing the apparent height. In some future day, when rational and complete education comes into vogue, there will be more faces on view which have individuality and character and can stand on their own merits without the aid of these subterfuges.

The white collar may be heartily approved of. Mr. Bernard Shaw's description of starch as "white Neck-wear mud" is of course amusing, but there is no more to be said for it. In point of fact, starch is not mud, but a conspicuously clean thing in history and in tendency, and there is something to be said for the smooth surface which it imparts to articles of clothing, as any visitor to a modern surgical theatre may realise. The high collar is, of course, senseless, except in so far as it might conceivably protect the relatively unprotected portion of the spinal cord from the injurious action of direct and intense sunlight. From the point of view of beauty, it may

be noted that anything which interferes with the natural poise and movement of the head is an obstacle to that grace of expression which is a deep and lasting ingredient of human attractiveness. The modern double collar is the superior of its predecessor as regards the influence of its edge upon the skin of the neck. A sharp or frayed collar edge furnishes a convenient instrument for rubbing bacteria into the skin, and is thus a very common contributing cause of boils and carbuncles.

The neck-band and collar must be loose, of course. It is an absurdity that when anyone faints we should be directed to loosen the clothing. There should be nothing to loosen anywhere, from top to toe.

An objection to the white linen collar, as to all light and pleasant articles of clothing, is the speed with which they become dirty. The dirt, however, is almost wholly atmospheric. City dwellers scarcely realise the foulness of the mess in which they grope. Within the present century, of course, we shall obtain smokeless cities, and then we shall be able to clothe ourselves more pleasantly and decently.

There is a good word to be said for the frequently changed and readily soiled shirt as an index of cleanliness, and as a means of protecting the less frequently changed underclothing. The stiff shirt front is, of course, silly. The flannel shirt, for those who can tolerate it, is doubtless a thoroughly sensible garment. It has the great advantage of looseness, and, being loose, is warmer in proportion to its weight than a close-fitting vest. It should be made of a thoroughly absorbent texture. Some men resent woollen clothing passing *closely* over the elbow, as do the sleeves of an undervest; and in the case of people with rheumatic tendencies the flannel shirt may be commended as supplying warmth to these important and somewhat susceptible joints. The flannel shirt also has

the virtue of supplying a reasonable amount of warmth to what may be called the lumbago region, which is also approximately the kidney region. In this respect a warm, loose absorbent shirt serves to cover the gap between the upper and lower garments. If, to take an extreme case, a small boy is to be clothed in that particularly absurd garment, an Eton jacket, the flannel shirt may be certainly commended for him. Cut somewhat long, also, this garment is of value as protecting the region of the sciatic nerve, which, unfortunately, there is no need to define more precisely. In passing from this subject, we may note that trousers should perhaps be cut somewhat high, in order to protect the middle zone of the body.

It has to be remembered that the upper part of the trunk is the chest, and that this structure has a back Coat and as well as a front. The fact is commonly waistcoat forgotten by those who wear the absurd garment called a chest-protector, with which they cover the front of the chest-wall *between* the two lungs, and is also forgotten by the incompetent doctor who, in examining the chest, confines his inquiry to the front, though it is well known that the earliest signs of tuberculosis of the lungs are more commonly to be found in the region of the shoulder-blade. The doctor who confines himself to the front of the chest in examining the lungs is either inexcusably ignorant or inexcusably careless, or both.

It follows that, so far as reasonable protection of the lungs from cold is concerned, the waistcoat as ordinarily made is somewhat difficult to defend. The natural explanation, however, is that the open coat or jacket does not profess to protect the front of the chest, and the warm part of the waistcoat is designed to fill this gap. The question of warmth, however, is not the really important one for consideration here. There is one natural, adequate, and never-to-be-

forgotten way of protecting the lungs from cold, and that is by breathing through the nose. If any reader will for a moment consider, he will realise that the temperature of the lungs can be far more readily lowered by exposing them to cold air from within than by exposing the outside of the chest-wall to cold. Nothing could be more foolish than to wrap the chest-wall in a chest-protector, and then inhale cold air through the mouth. If this book gave forcible statement to no other true opinion than that one should breathe through the nose, it would have justified itself. It has already been pointed out that in nose-breathing the air is warmed, and it may be added that in any case we could never tolerate the breathing of the air of temperate zones if this air were passed directly into the lungs. As a matter of fact, it is only the air in the upper part of the air-passages that is changed at each ordinary respiration, so that the cool air from without, already partly warmed by its passage through the nose, is much further warmed before it is diffused in the lungs themselves.

These remarks will not be held irrelevant by the reader who realises that they indicate the true fashion in which to keep the chest warm. The second important point about the coat and waistcoat depends upon the fact that they cover a part of the body, namely, the chest, the absolutely free and ceaseless movement of which alone meets the fundamental vital necessity, which is to breathe. Here again a sound hygiene introduces us to the study of disease. I say again that no book can perform curative medicine directly. Yet it is possible in a book to lay down rules of life which, if followed, would render consumption sanatoria, for instance, superfluous. I will not tell you how to treat a cough, but I will tell you how to avoid the need for coughing.

The importance of full expansion of the lungs may

of course be assumed as a likely principle. Its likelihood is reinforced by those numerous pathological *Clothes and* inquiries which show that the germs of breathing consumption very commonly take up their first abode in the lung at the point where its movement and the change of air and blood within it is least vigorous and free. Quite lately this principle has been applied to the treatment of consumption by means of breathing exercises carefully graduated and designed. It seems quite clear that the systematic use of these exercises is of real value as a truly curative measure for this disease. It certainly can hold up its head in this respect amongst the ordinary medicinal measures, which may be comprehensively described as the administration of poisons in less than fatal doses—or shall we say less than immediately fatal doses? As to the value of adequate breathing in the preservation of the health of the lungs, and in the prevention of tuberculosis in especial, there can be no question. It does not suffice to breathe pure air; it must be properly breathed. Even if the air be impure, it must be breathed in any case, and is better breathed well than badly. Practising physicians are not infrequently struck by the existence of what would appear to be some subtle difference between fresh air and open air in their value for a patient. This difference, I believe, will defy chemical analysis. It may be guessed that the superior value of open air really depends upon the fact that in it the patient is stimulated to breathe more deeply. Indoors the air may be of the same chemical composition, but less adequately breathed.

The truth is that all living organs and functions require adequate exercise for their health. This, at any rate, is true of all the organs and functions concerned with the individual maintenance, though modern views of heredity explain to my mind how it is that the principle does not similarly apply to the organs and

functions concerned with racial maintenance. At any rate, it applies to the lungs. Their health is dependent upon adequate exercise, which the civilised man of to-day too commonly denies them. Many of us deny it to them altogether; many others breathe adequately only during occasional spells of exercise. The curative value of adequate breathing in tuberculosis, which is an observation of yesterday, must be regarded as of the foremost importance in its bearing upon the duty and practice of health.

All this is said here not with the understanding that I shall not say it elsewhere—for it cannot be too frequently repeated—but because it is strictly relevant to our present question. So far as the lower part of the trunk is concerned, warmth may or may not be a chief consideration; so far as the upper part of the trunk is concerned, the real question of warmth is a question of breathing through the right channel; the most important question as regards clothing is that not in the smallest degree shall it hamper the movements of breathing.

The point here, then, is that the coat and waistcoat must not be tightly cut, and that this principle applies especially to the lower part of the chest. The shape of the chest is that of a cone, having the apex at the neck. The most capacious part of the lungs is therefore lowest. The natural act of breathing is therefore so performed as to effect especially the expansion of the lower part of the chest. In other words, normal breathing in both sexes and at all ages is diaphragmatic or abdominal—effected, that is to say, by the midriff or diaphragm, the great muscle which is stretched across the middle of the trunk, forming the floor of the chest and the roof of the abdomen. It used to be, and perhaps still is, stated that a woman, though not a baby girl, normally breathes especially by the movement of the upper part of her chest. This

is not true. The so-called "collar-bone" breathing" of women is an unnatural device, dependent upon the fact that the expansion of the lower part of the chest is hindered by the corset, the hampering action of which is thus attempted to be compensated for.

The foregoing is physiology, and my subject here is not physiology but hygiene, but it is necessarily stated in order to demonstrate the grounds for the dictum that if the doctrine about looseness of clothing applies anywhere, it applies to the waistcoat. That is much the most important thing to be said about the waistcoat, and I shall say nothing else.

The reader may well be as weary as I am myself of the constant reiteration of the demand for loose-Abdominal ness. We have each other's sympathy, clothing I hope. Nevertheless, in passing to the consideration of the clothing of the abdomen this again is the chief demand. The abdominal organs are extremely well protected from cold by their position, their rich blood supply, their heavy clothing of muscle, and in a host of the well-to-do of both sexes they are further protected by a highly superabundant layer of abdominal fat. Probably, on the whole, the abdomen is really better able to look after its own warmth than any other part of the body—the face and hands certainly not excepted. We agree, however, to clothe it, and the first thing we have to learn is that this also is a part of the body the free and ceaseless movement of which is scarcely less necessary than that of the chest. Abdominal breathing, as its name implies, demands the freedom of the diaphragm to move downwards, causing the elastic front wall of the abdomen to bulge. Tight clothing here, whether in the form of a corset, a belt, tight-fitting trousers, or whatever it may be, therefore interferes with the proper performance of the act of breathing. This, however, is by no means all, indicating, indeed, only one-half of the indictment

that may be urged against the clothing of many of us, in its interference with the functions of the abdomen.

The front abdominal wall is a structure of deepest interest to the anatomist and surgeon, of course, especially in consideration of modern operative surgery, and also the possibility of partial escape of the abdominal contents through its weak points. By no means less interesting, however, is the physiology of this structure, and its importance in aiding the proper action of the contents of the abdomen. Essentially the front abdominal wall is a sheet of muscle and, like muscular tissue in general, it is elastic. Though we think of the abdomen as a cavity, it is a cavity that is always full. It contains no holes or empty spaces. This is insured by the atmospheric pressure outside the body, together with the elasticity of the normal abdominal wall. Now voluntary muscular tissue, such as that which composes the abdominal wall, is not only elastic, but in various parts of the body is normally and continuously in a state of slight but continuous and definite contraction, which is commonly called its *tone*. We remember, further, that this structure with its elasticity and tone is in incessant rhythmical movement indirectly in consequence of the action of the diaphragm in breathing. A considerable part of the act of expiration is played by the elastic recoil of the abdominal wall so soon as the diaphragm relaxes. If this wall has lost its mobility, its elasticity, or its tone, the normal performance of breathing is by so much rendered impossible.

But, further, the continuous pressure of the abdominal wall upon the abdominal contents regulates the amount of blood contained in the abdomen, helping to keep up that gentle and even pressure on the veins which veins in general require. More important still, this exquisitely adapted elastic pressure—to be counterfeited by no elastic binder or belt ever yet or ever

to be contrived—is one of the normal tonics and stimulants for the movements of the muscular tissue inside the abdomen—that of the stomach and bowel. Directly the abdominal wall becomes relaxed, losing its tone or losing its elasticity from being overstretched—as is very commonly the case in gross and over-fed and also in merely sedentary persons—the normal aid to the action of the stomach and the bowel is withheld. They, too, are now apt to become distended, feeble in tone, and sluggish in their response to stimuli from their contents. In a word, one of the most prevalent bodily ills of the present day, viz. constipation, with all that it implies, the many evils, small and great, to which it contributes, is in no small measure a consequence of this failure on the part of the abdominal wall to perform its physiological function. It is more than a wall, it is a living wall evolved in adaptation to the habits and needs of the organs which it helps to enclose. Now, of course, lack of exercise is very largely responsible for this common defect in the abdominal wall, especially if to this be added the effects of over-distention from within due to over-eating or over-drinking. It is also true that in some cases the defect may be of central origin, and depend upon failure in supply of nerve force to the abdominal muscles, the health of which, like that of all muscles, depends upon the brain. But it is also true beyond a doubt that the functions of the abdominal wall are very gravely interfered with in many cases—doubtless in far more than 99 per cent. of all women—by the clothing. It is a law of life, as we have seen and must see many times again, that a supported structure will cease to support itself. Put a whole man on crutches, and you paralyse his legs. This is a general rule applying to education of skin, stomach and reason alike. Thus, so soon as we apply artificial supports to the abdomen, so soon do we begin to paralyse the abdominal mus-

cles. This might be worth while if the support were perfect. It is always worth while to save the body by the exercise of the mind, in accordance with the general principles of progress. Cooking, for instance, is worth while. The principle of saving the body, however, breaks down directly and whenever the artifice is less adequate than that which it replaces. In this case it is simply inconceivable that any artificial device can ever accomplish the work which is accomplished by the normal abdominal wall.

It is therefore fundamentally wrong, as has been a thousand times stated, to support or constrict the waist for any purpose whatever, æsthetic or utilitarian. The time has not yet come, however, when civilised mankind and womankind in general will cease to disburse incredible sums every year to those who sell aloes and one or two other drugs under fancy names—whilst at the same time scrupulously continuing to paralyse every day the natural means by which the abdominal functions should be carried out. We must return to this most important subject later, when we come to consider the question of constipation in general. Here, however, we must merely note, as we shall note again, that the question of clothes is necessarily involved, the normal tone and movement of the abdominal wall being part of the naturally appointed means for the assistance of the bowel in its normal functions. No especial reference need here be made to the corset, which is, of course, condemned in the condemnation of whatever garment or method of clothing involves constriction, paralysis, and flabbiness of the abdominal wall.

A word must be said regarding the clothing of the knees, both on their own account and for general application to the protection of large and exposed joints. We must remind ourselves that every part of the body, without exception, must

The
knees

maintain itself, in order to live and work well, at the temperature of 98.4° to 98.6° F. Those parts of the body, such as the extremities, which perform little combustion for themselves, must have their temperature kept up by the hot blood reaching them from the central fires. Joints are conspicuous as structures which produce no appreciable warmth for themselves. They are also exceedingly complicated, very delicate, very constantly used, and by no means infrequently abused. The knee, as the largest and most complicated joint in the body, is conspicuous in all these respects, and, like the joint of the great toe—another conspicuous sufferer—it is faced with certain permanent difficulties which depend upon man's adoption of the erect attitude. The manner, for instance, in which the knee is locked when a man stands erect is one of the marvels of the bodily mechanism. It is therefore no more than reasonable that this most important and delicate joint should be properly clothed. It would be difficult, I grant, to prove that the common exposure of the knees of children is actually a source of injury. But it must surely be a good rule that, in general, the knees should be sensibly clad. They certainly need more attention in this respect than the elbows, the corresponding joints of the upper limbs, which do much less work, and the circulation through which is not apt to become stagnant as it is in the case of the knees, owing to the influence of gravitation. Therefore, as on general grounds, it is wrong to wear a garter above the knee, as indeed below it, or a constricting band of the kind in any part of the body.

The socks or stockings should be absorbent if any article of clothing is, and they cannot be too frequently changed. Though it is a familiar axiom
The feet that the feet should be kept warm, we have already noted that this special requirement of theirs is induced by education. There certainly is no inherent

reason why one should catch cold because the feet have become cold, any more than in the case of the hands. The feet, however, are specially liable to become cold, not merely from their nearness to cold surfaces, but from the fact that they lie at the base of a column of blood which, owing to man's erect attitude, has to ascend for a long distance against gravitation. The clothing of the feet, then, should be loose. Doubtless, the liability to stagnation of the circulation contributes, with many other difficulties under which the joint of the great toe labours, to its remarkable aptitude for attack by poisons generally circulating in the blood, those of gout offering the most striking instance. Every one is notoriously familiar with the fact that the feet are perhaps the worst ventilated parts of the entire body, at any rate as clothed for walking. The nearest approach to a remedy is furnished by frequent changing of thoroughly absorbent foot-wear and by ventilation of the feet from within, so to say, by means of free circulation of the blood.

The arch of the foot is to be artificially supported by the structure of the boot only under the most critical and expert surgical advice. This is the last of the conceivable remedies for flat foot, and always constitutes a confession of failure.

The use of the heel of boots and shoes is not unreasonably to be defended on the grounds, as to which there can be no doubt, that the human foot is very imperfectly adapted for the erect attitude, and that, though man is what is called a plantigrade—that is to say, he walks upon the soles of his feet, and not upon the tips of his toes, like the digitigrade horse or ox—yet his foot is really semi-plantigrade, and it is the ball of the toes that it is really adapted for walking upon. It is the ball of the toes that we walk upon, of course, when we say that we walk tip-toe. The ballet dancer, the horse, and the ox alone walk

really tip-toe, or indeed, in the case of the animals, tip-nail.

The heel, then, for serious purposes, may well be specially protected. The object, however, is protection, not elevation. What we require is merely something rigid to protect the skin and the underlying bone from injury due to uneven pressure. If the acquired characters of individuals were transmissible to their children, we should now, no doubt, after so many ages, be endowed with, shall I say, tack-proof heels, but heredity does not work in that fashion.

Directly, however, in addition to mere protection of the heel, we add its elevation, we commit a cardinal error which frustrates the whole mechanics of the foot, and injures the instep and the toes alike. The weight of the body is naturally transmitted through a line which passes through the heel. When the heel is raised this axis is altered, and the weight now impinges upon the instep, with its wonderful arch and flexible joints. These, of course, are necessarily rendered rigid, the support of the arch is interfered with, everything that gives elasticity and grace to the gait is destroyed. There is no kind of defence for the high heel. Not only does it injure the foot, not only does it augment the pressure, in any case unnatural, to which the joints of the toes are subjected, but also, by interfering with the elasticity of the gait, it insures that walking shall involve a series of small shocks to the entire body, shocks chiefly borne by the spinal column, and primarily shared in by the brain and spinal cord.

The use of rubber for the heels of boots and shoes is an excellent and highly-to-be-commended innovation. It performs a real service in reducing the jars of walking, and it is one of the very few modern inventions which tend to reduce rather than increase the strain to which our ears are subjected.

It seems to be the case that the second toe is

naturally longer, by a very small amount, than the first toe, but it is, of course, much more readily bent, and therefore, in choosing boots and shoes, we commonly determine their length by the length of the inner border of the foot. They are thus made long enough to accommodate the great toe in its extended position, but the second toe, in order to find room at all, has to be slightly bent. Thus probably the large majority of all feet amongst civilised people display some measure of the condition which is commonly known as hammer-toe. This often becomes a real nuisance. A corn often forms on the over-bent joint, and walking is seriously interfered with. Until quite recently the second toe was in many cases amputated altogether by way of remedy. We should, of course, have our boots long enough, and avoid these inconveniences. In this connection there is something to be said for the American boot.

The great toe is, however, much more seriously affected by unsuitable clothing. Its principal joint is, in any case, as Darwin pointed out, in permanent difficulties owing to our erect attitude and manner of progression. As if these were not enough, practically every boot and shoe that is made complicates the matter further by permanently altering the axis of the joint. The inner border of the foot should be a straight line, but the inner border of practically no boot or shoe is a straight line. The consequence is that the toe is bent outwards, and the joint, which is incessantly used in walking, is compelled to work at an unnatural angle. Probably this one fact is sufficient, I suspect, to account for the unique susceptibility of this joint to the poisons of gout. As every reader knows, another trouble called a bunion is often apt to arise, this being due wholly to the unnatural deformity caused by our unnatural footwear. The cure of a bunion is difficult or impossible.

Its prevention is perfectly easy on paper, perfectly easy in practice, so far as the mechanical requirements are concerned, but at bottom it depends upon a state of the mind which permits the owner of the feet in question to give his great toes fair treatment custom and appearance notwithstanding. In order to prevent bunion, have the inner side of the boot straight.

It is the boot, again, that is responsible for the condition called in-growing toe-nail. The treatment of this is no concern of mine here. It is due to too tight boots, and I, for one, do not believe that it has anything whatever to do with any particular fashion in which the nails may or may not be cut. It is well to cut the toe-nails more frequently than many people do, and to keep them clean, but this will not prevent the formation of in-growing toe-nail if the boots are tight, and their intermittent pressure—in parallel with other cases, such as corns, of which no more need be said—stimulates the growth of the nail sideways.

THE NEED OF EXERCISE

THE word asceticism does not really mean the denial of the body, the refusal of anything, but has the far wiser and truer meaning of *exercise*. This word, in its turn, we commonly and conveniently take to mean muscular exercise only; and here a writer who attempts to be fair and to indicate the true mean between extremes is at once beset with difficulty. He knows that man is a muscular animal, that the muscular system is a whole, and that some measure of exercise remains desirable, even if only for the sake of the relatively few muscles which continue and will always continue to be of incessant use for man. He knows, too, that the health of certain parts of the muscular system determines the health of many internal organs, and that the muscles, even if their primary use of movement were made superfluous, would still remain essential as the fireplaces of the body—the chief sources of its heat. He knows also that exercise takes us very frequently into the fresh air, and, yet again, that the need for it is all the more urgent in an age of general over-eating, the ill effects of which it in some measure neutralises. On the other hand, he sees the most monstrous claims made for systems of physical culture, and finds thriving institutions in every capital which preach not merely that the first thing is to be a good animal, which is true, but that this is the only thing, though he knows that man is a mind, and imperils his human state whenever he forgets this truth. Lastly, he knows that moderate and balanced opinions never make the appeal which is the privilege of extreme opinions. Fortunately, however, we have in the principles of the new asceticism an efficient guide.

By the cult of muscle I mean the modern craze which teaches, in effect, that there is nothing great in man but muscle, that to be a good animal is every-

thing, that the whole trend of evolution towards the supersession of the physical by the psychical is an error, and that the man should be ashamed of himself who permits a single muscle, however humble or obscure, to remain any smaller than the utmost exercise can make it, even though it be palpably a relic from some period when our ancestors grasped the boughs of trees with their feet, or used their mother's tails as towing-ropes.

The cult of muscle, like cults in general, is highly profitable to its chief priests, amongst whom are to be included some of the most enterprising and most skilful men of business of the day. When a recent outcry was raised in Great Britain regarding the physical state of the people, and a report was issued concerning the school children of Scotland, the most conspicuous of these advocates of muscle issued a copy of the report printed in double columns, so that his remarks might be placed opposite each of its conclusions; and ever the burden of his song was physical training. The theory is that, having killed many babies outright by compelling them to eat poison, drink poison, and breathe poison, and having administered similar nourishment to the survivors, defying for years together the most elementary and cardinal principles of ventilation, cleanliness, and diet, you may make good the damage by muscular exercise—even to the extent, presumably, of straightening rickety bones and rebuilding rotten teeth. To any one who knows what the physical state of the lower classes is, what are its causes, and what are bound to be its ultimate consequences if these things continue, it is nothing less than sickening to find the cult of muscle applauded and accepted in this preposterous fashion. As I have said elsewhere, it may be possible to gain a spiritual paradise by a death-bed repentance after years of villainy; but if the doctrine of consequence means anything, it

assures us that a physical paradise is not to be won by a belated and disproportionate and spasmodic attention to one of the minor laws of health, after the most important years have been spent in defiance of the primal laws of man's physical being. If we are to breed the kind of people upon which alone an empire can be built, it is a cult not of muscle but of motherhood that first demands our knee.

But apart from the services of physical training for long-poisoned childhood, certain of its general claims require criticism. Its whole principle consists in a denial of the primary truth that in man mind is the master and body the servant. Further, it wholly ignores the evolutionary truth that there is, as Professor Metchnikoff puts it, a disharmony in man's present constitution, whereby he inherits from a non-human state a host of structures, muscles included, which, however interesting, are only to be regarded as a most embarrassing kind of heirlooms, and the tendency of which to decadence is to be welcomed as a sign of progress. Put back the clock, says the cult of muscle; whatever else you may forget, remember that you are at bottom an animal. The real business of your mind is to indicate how best your muscles may be developed. Be muscular and you will be happy.

But the principles of the new asceticism will guide us here. They teach that the cultivation of muscle is a means, and not an end. They remind us that, as physiology knows, muscles are really the end organs of certain kinds of nerves called motor; and that the muscles for which the nervous system has no purpose are simply a burden. A muscle is a living organ of great inherent vitality, whether it be used or not. Its upkeep demands a large supply of food and a constantly working apparatus for disposing of its waste products. The highly muscular man, developed by one of the modern systems, requires much food, and throws

a heavy burden upon his digestive and excretory organs. If he is a professional weight-lifter, the monetary and vital expenditure is perhaps warranted, but otherwise its propriety is highly dubious. The new ascetic, however, remembers that the brain is the man, and for all cults he has one question: How will your ritual serve my brain, which is, physically speaking, myself? It is by this that they must be judged.

Now it is doubtless true that the boy or youth who is successful in his studies is often conspicuous in games, though innumerable exceptions to this rule exist, and though everyone knows the athletic boy or youth who is, *inter alia*, a fool. The boy with a good nervous system and with abundant energy expresses his good fortune very often both in study and in sport, but there remains a permanent and necessary antagonism between development of mind and development of muscle beyond a certain point. The highly muscular man makes large demands upon his blood for his digestive tract and for the muscles themselves. By so much must the brain be depleted. Again, the exercise of muscles definitely produces poisonous products which cause fatigue. The blood of a fatigued dog, injected into an animal that has been at rest, will immediately produce the symptoms of fatigue in it. These toxic products have been definitely proved to poison the brain. Nearly half a century ago Herbert Spencer pointed out, in that wonderful masterpiece, his book on Education, that "Nature is a strict accountant; and if you demand of her in one direction more than she is prepared to lay out, she balances the account by making a deduction elsewhere. . . . Excess of bodily exercise diminishes the power of thought. . . . In peasants who spend their lives in muscular labour, the activity of mind is very small." And now Professor Mosso of Turin, the greatest living student of the subject, has

conclusively proved that the poisonous by-products of muscular exercise, circulating in the blood, temporarily depress the brain. All these things the new ascetic must remember. In determining, then, the value of exercise, its function, and its most useful forms, the mind is to be our criterion, and not the circumference of the upper arm: brain, not biceps. The question is not whether a certain form of exercise increases the bulk of any muscle or all the muscles, but whether brain and mind are better for it. If so, it is good; if not, it is bad; even though you may have developed to the utmost every muscle in your body, and are as hideous an example of hypertrophy as any modern wrestler.

The value of exercise, then, is not at all that it makes us muscularly stronger, with the consequent necessity of having to devote a higher proportion of ~~The value~~ our vital energy to the muscular upkeep; ~~of exercise~~ but exercise is valuable, for instance, because, quite apart from the use of muscles as agents of locomotion, their reasonable maintenance is necessary in order to keep us warm. They are the chief sources of the body-heat. Further, the general health of the muscles—which, as in the case of all living structures, everywhere, cannot be maintained without use—is desirable in that certain bodily functions (as, for instance, those of the stomach and bowel) are not properly performed unless the voluntary muscles of the body wall are in a state of healthy tone. Again, a reasonable activity of the muscles tends in some measure to protect us from the consequences of over-eating in which we habitually indulge. But the moment that exercise develops the muscles, except in people who live by their muscles, to an extent beyond that indicated by these requirements, then it simply increases the burden of the body which has to be borne by the mind.

If the voluntary muscles daily become less important

in the life of man, certain of the involuntary muscles retain, and must always retain, their primordial importance. Of these the chief is the heart, far and away the most important muscle in the body. The peculiar imbecility of our present theory of exercise is nowhere so well instanced as in the drill regulations of the British army, which are much devoted to the enlargement of the chest. This end is attained by certain disastrous exercises which, whilst enlarging the chest and developing certain voluntary muscles, very frequently indeed strain the heart—to the utter ruin of the soldier, of course, even as a machine. Here a doctor and there a doctor, braving official displeasure, have protested against this drill, and it will shortly be abolished, we may hope. Meanwhile, it stands on record that in the year 1908, the powers that be devote themselves, notwithstanding the lessons of the recent Boer and Russo-Japanese wars, in the first place, to making the soldier into an automatic machine, and, secondly, adopt to this end means of all conceivable the most exquisitely calculated to ruin him even as a machine.

But in truth exercise has scarcely a more valuable function than that, in using the muscles which we can see, and in which we take so anachronistic an interest, it exercises and preserves the health of the heart, upon the health of which body and mind are equally dependent. This, then, is a chief function of reasonable exercise. The phrase does not exclude violent exercise, by which is usually meant such as causes us to become out of breath. But if the health of the heart is to be considered, violent exercise must not be too long pursued, even though by training the advent of shortness of breath may be indefinitely delayed. It has been recently stated that there is scarcely a professional cyclist to be found in Germany with a healthy heart.

There are two ways in which the heart responds to

excessive exercise. In some cases it undergoes development or hypertrophy in response to the need. Such hypertrophy does not matter in the case of an ordinary muscle. In the case of the heart—though it may be indispensable in heart disease—it is always a source of danger, since the blood supply of the heart itself is inexorably limited, and since the last state of cardiac hypertrophy is fatty degeneration of the over-grown muscle. On the other hand, the heart may fail to make a vital response to the increased pressure within it which over-exercise entails, and in consequence it simply dilates. The dilated or over-stretched heart is of course inefficient: and this is the kind of heart which, as the result of months of carefully misdirected labour, we commonly induce in our recruits. This also is the kind of heart with which a man returns home after a holiday which he has devoted to “healthy exercise.” Having nicely adapted his heart during eleven months in the year to the extremely modest requirements involved in a little quiet walking and much sitting in a chair, he devotes himself during the remaining period to various athletic feats designed to set him up for the coming year. Not infrequently the greater part of the coming year is spent in slowly and painfully coaxing the heart, thus overstrained, to return to its natural size.

Thus whilst reasonable exercise of the external muscles is of service in reasonably exercising the most important of the invisible muscles, over-exercise may do it grave injury—but rarely, perhaps, irreparable, yet none the less to be deplored and avoided. Should the reader inquire as to what I mean by reasonable exercise, as to how many miles, upon what gradient, he, the particular reader, should daily cover, in how many minutes—the answer is that, not wishing to be taken for a fool, I do not propose to answer that question. The reader, however, must be so described if he cannot

find out the golden mean for himself—which, as likely as not, of course, is the golden mean for no other. It is to be added that exercise is of value in promoting the circulation, apart from its effect upon the heart. When a muscle contracts, it squeezes the veins and the lymphatic vessels in its substance and its vicinity, and forces their contents onwards. It also aids the movement of the fluids of the tissues generally lying outside the actual vessels of the circulation.

The influence of exercise upon the lungs is of great value in promoting their own health, and also, for instance, the health of such an organ as the liver, which is gently, rhythmically, but effectively squeezed in the course of deep breathing. When at rest we take only very shallow breaths, thus in all probability exposing certain parts of our lungs to various kinds of attacks by microbes, to which they are laid open by lack of movement and stagnant circulation. In persuading us to breathe deeply, exercise has a value far greater than any that can be referred to the muscles exercised themselves. One of the best and most natural exercises in the world, from this point of view, is singing, which may be heartily commended to all who fear consumption or are liable to bronchitis, or, indeed, any disorder of the respiratory system. Singing involves, of course, breathing exercise, and deep breathing as such is beyond a doubt the most valuable of all exercises that can be named. We may even go further, and say that other forms of exercise may well be valued—so far as the body is concerned—in exact proportion as they promote deep and unfettered breathing. This best of all exercises may not promote muscular strength nor increase the circumference of the limbs, but it makes directly for the health of the heart, lungs, liver, and abdominal organs in general, and thereby greatly serves the brain. The only rational defence on our

principles for most of the systems of exercise in vogue, is that though they are aimed at, let us say, the aggrandisement of the biceps, which matters nothing at all for man, whatever it may be worth for the hippopotamus, they do incidentally promote deep breathing, with all its beneficent consequences.

Now it has to be observed that deep breathing is of very little value unless it be the breathing of pure air. Hence one must protest as vigorously as possible against all the rituals of the cult of muscle which keep any one indoors. If you have to choose between exercise in the ordinary indoor atmosphere and lying supine in the open air, you will do well to choose the latter. Every indoor gymnasium, every system of developers and exercisers, is to be condemned if it keeps people indoors. There does not begin to be any comparison on the score of health between the most elaborate and carefully thought-out system of indoor exercise, however complex the apparatus and certificated the teachers, and the most informal stroll or scamper out of doors. I do wish to insist upon this point. In all large cities nowadays there are to be found people of both sexes who devote some portion of the day to exercise—not because they particularly enjoy it, but for the sake of health. To this end they go indoors when they might be out of doors. Boys and young men are encouraged to measure their progress and profit by the size of their muscles, and the teachers publish photographs showing the marvellous development of the muscles of the shoulder girdle or the upper arm under this or that system. But nothing at all has been accomplished when these muscles have been developed to their maximum size. Much less than nothing has been accomplished if their owner, whilst developing them, has been breathing the ordinary air of an indoor apartment when he might have been out of doors.

Any one who will consider for a moment the natural constitution of man and the principles of natural education, must agree that the deplorable dumb-bells thing called a dumb-bell offers an exquisite parody of what exercise should really be. The cat, as she exercises her kittens along the lines of their natural proclivities and needs, never telling them that this is exercise for the sake of exercise, and certainly prepared, if she could, to turn up her nose at any artificial implement we might offer her—should be our model in this respect. It may be imagined that some unfortunate girl, brought up on early Victorian lines, having never before been permitted to wear comfortable garments, or to stretch her arms, would welcome and enjoy the use of dumb-bells when first introduced to them. But any one who has had a natural childhood and who has been taught to play, and who has taken his or her exercise naturally and incidentally in the course of pursuing some mental interest—any such person may be excused for thinking that a pair of dumb-bells should be deposited in our museums as indications of what was understood by exercise, even as late as the earlier years of the twentieth century. All exercise for the sake of exercise is a mistake—or, at any rate, a second best. You may do your mind, and body too, more harm by sheer boredom than you may gain good from the exercise you go through. The dumb-bell symbolises the fact that the most elementary and obvious truths of psychology are still unrecognised, though the play and games of every natural child—if you object to be instructed by kittens—should be perfectly sufficient to teach us what indeed nature taught us ages ago, if only we would listen to her.

Half a century ago, in discussing physical education, Herbert Spencer—to whom the girl of the present day owes a debt of which she is wholly unaware—uttered a forcible protest against the fashion in which exercise

was parodied by those who controlled the school-girls of the time. In five months he never heard a shout or a laugh proceed from a girls' school only a few yards distant from his house. Once in that period he saw a girl chase another round the garden. Then in general criticism he goes on to point out that, latterly, "The natural spontaneous exercise having been forbidden, and the bad consequences of no exercise having become conspicuous, there has been adopted a system of factitious exercise—gymnastics. That this is better than nothing, we admit; but that it is an adequate substitute for play we deny. . . . The common assumption that, so long as the amount of bodily action is the same, it matters not whether it be pleasurable or otherwise, is a grave mistake. . . . The truth is that happiness is the most powerful of tonics. . . . Hence the intrinsic superiority of play to gymnastics. The extreme interest felt by children in their games, and the riotous glee with which they carry on their rougher frolics, are of as much importance as the accompanying exertion. And as not supplying these mental stimuli, gymnastics must be radically defective."

"Granting then, as we do, that formal exercises of the limbs are better than nothing—granting, further, that they may be used with advantage as supplementary aids, we yet contend that they can never serve in place of the exercises prompted by nature. For girls, as well as boys, the sportive activities to which the instincts impel are essential to bodily welfare. Whoever forbids them, forbids the divinely appointed means to physical development."

Spencer is, as usual, profoundly right, and considering the modern cult of muscle, his argument is perhaps in some ways more needed now than it was in the fifties of last century. Supremely important is the argument based upon our emotional attitude towards exercise. Happiness is, of course, incomparably

the best tonic, better even than sunlight. Many wretched patients are condemned by their doctors to take exercise in forms which they do not enjoy. Such exercise does them more harm than good. Nothing can be more pitiable than to have an allotted span which you must cover, and to count the yards as you walk until the thing can be done with. The exercise that does you good is that which you are wholly unaware of. Go for a walk with the right companion, and though you do not even know that you are walking, you benefit both in mind and body. Similarly with the cricketer. As he "steals" a run he is not considering that this is twenty yards covered from crease to crease; he is playing a game. All natural forms of exercise involve enjoyment, and are themselves incidental and subsidiary advantages involved in that enjoyment.

This is one of the great advantages of golf for the middle-aged and elderly. It is not merely that the golf tempts you out when you would otherwise stay at home. Even if you walked just as far for the sake of the exercise, but without an interest, you would not benefit to anything like the same extent. It is the enjoyment, the excitement of the game, that benefits you most, the fresh air next, perhaps, and the exercise last. These remarks are not to be taken as involving any commendation of golf for younger people, for whom it has a relative defect that must be referred to.

For observe that play is superior to all artificial exercise, not only in the enjoyment involved, but also in that it has respect to the nervous system. With a dumb-bell you simply lift so much matter, so many times, through such and such a distance, and the action is upon the muscles involved. But in a game you exercise what are immeasurably more important than your muscles, your senses—especially those of touch and sight. Thus the game has the advantage dependent upon the fact that the brain

is the man, and not the muscles. Not only does the game exercise the senses, but it exercises the motor nervous apparatus. The value of the purposeful movement made in a game is of a wholly different order from that of a not dissimilar movement which may exercise just the same muscles; for it involves the training of the neuro-muscular apparatus as an instrument of the will. The exercise is merely one of the incidental advantages.

Play, then, or at least what we enjoy for itself, is the best exercise. If you actively enjoy swinging dumb-bells, well and good, though it is a pity that you do not prefer something which exercises your senses. The best play has certain requirements. It must be in the open air. It is practically certain to be with a ball. Of such games there are two kinds—those in which you hit a moving ball, such as cricket, and hockey, and tennis, and those in which you hit a stationary one, such as golf and croquet. Both kinds exercise the senses, but the former have the great advantage of introducing the question of time, and exercising the senses in a much more complete and valuable fashion. There is no reason in the world why a man who looks after himself should not play such a game as tennis in his fifties. I almost think it is a pity that a boy or youth should play golf when other games will give him everything that this does, and, in addition, that quickness and accuracy of co-ordinated response which can be so easily learnt in youth, but with great difficulty, if at all, in later life.

Most important, however, is the question of enjoyment, which is absolutely cardinal. You are out to exercise the whole man, not merely your muscles. Every pleasure raises the tide of life, and it is the enjoyment of the game, far more than the mere exercise, that is hygienic.

We treat our subject under various heads, but the

body is a whole. Such questions as those of clothes, food, and exercise cannot be properly discussed without relation to each other. A motor-car can only run so many miles on a gallon of petrol. The more exercise you take, the more food you require. Thus, an amount of food which constitutes the grossest over-eating in the case of a sedentary man may be only just adequate for one who takes much exercise, whether at work or play. The question is simply one of fuel. Unfortunately we are not so constituted that the man who takes an excess of fuel for its own sake, finds himself impelled to exercise. If excessive food acted as a stimulus to exercise, there would be, in effect, no such thing as over-eating. On the contrary, over-eating disinclines us for exercise both by over-loading the machine with fat, and by poisoning the nervous system with waste products. In olden times *the pleasures of the table were compensated for in advance by the pleasures of the chase*. Now our food is obtained for us, and we run the risk to which so many succumb. However, if the reader, as is quite possible, does actually find it difficult to reduce his diet, he can protect himself if he will take proportionately more exercise. The systematic use of dumb-bells may offer as uninviting a prospect as the suppression of favourite dishes, but let the reader find an outdoor game that will amuse him.

If you can find an exercise that really engrosses your attention, whether because of the skill it demands, or through the stimulus of competition, then you will certainly obtain real recreation. Play has no more valuable attribute than that of wholly changing the mind's occupation. Caring nothing about the size of biceps, I would applaud amusing exercise on the ground that it takes the mind away from the struggle for existence—often by substituting a mimic struggle for existence—and thus

directly serves the self. The exercise that does not exhilarate is to be condemned. For this reason we must stop short of undue fatigue, though probably undue fatigue is not often to be feared even from almost unlimited exercise of a thoroughly enjoyable kind, taken without any thought to the distance you are covering, or the like.

When asked to recommend the best exercise, the doctor usually feels bound to name walking as natural, safe, and generally applicable; but the best exercise best exercise, other things being equal, is that which you most enjoy. If you find that walking exhilarates you, well and good. It is, however, a form of cruelty, to my mind, to prescribe walks, often solitary, for people who take no interest in them. Such walks may do more harm than good. It is, perhaps, possible to name the best exercise on the assumption that man is a machine, but on any other assumption we must find out in the individual case what is enjoyed. On the other hand, those exercises are bad which take you out of the open air. Those are bad which require muscular exertion such as interferes with breathing; of these weight-lifting is typical. Those may quite well be ignored, except for the professional artist's model, which boast that they produce a uniform development of all the muscles of body. Probably the exercise which best answers to this description is swimming, and swimming is, of course, to be commended, but not for this reason. Those exercises are bad in which you are stimulated to put in "the last ounce." Here, again, is another argument in favour of games, as against even such comparatively natural forms of exercise as running races. You may play a game for all you are worth, but if it is a high order of game, this does not involve putting in "the last ounce." On the contrary, you are probably "giving runs away" when you bowl as fast as you can. But in the more primitive forms of athletic contest, such as

running races, the purely physical element is uppermost, and you may be tempted to exertion of unimportant muscles, which will gravely injure your heart, the most important muscle you possess. And if other kinds of races are to be questioned, especially for the young, swimming races are notably to be criticised on account of the very great exertion involved under conditions which are not natural, however excellent within limits.

There are plenty of cases on record of men and women who live to great ages, in excellent health, sometimes producing wonderful products of mind, yet who take no systematic exercise necessary? at all. They prove, at the least, that systematic exercise is not a necessity for every one. If we knew more of such cases, however, I believe we should find that in order to do without exercise you must be an extremely moderate eater. It may be questioned whether special exercise is really indispensable for any one, if he will sufficiently restrict his diet. This is not, of course, to say that no exercise is required (though, for the matter of that, people will live in bed for decades), but I do mean that, so far as the mere contraction of muscles is concerned, the ordinary amount of exercise which the life of the most sedentary man affords is perfectly compatible with health if he will eat lightly enough. The value of recreation is another matter altogether. But such a man may find, let us say, a game of chess his best recreator—far better than a walk which gives him no pleasure.

In a word, we have to distinguish between mind and body in this matter of exercise. In so far as we are motor-cars, something will go wrong if we force in fuel without consuming it. The engine, however, can be kept in good running order with a minimum of use if we avoid over-feeding and over-lubrication. So far as man is a mind, however, and is largely compelled to

devote his attention to things which do not satisfy him in themselves, but afford him a means of life, he requires abundant recreation in the form of occupations which are ends in themselves, if he is to preserve his mental health. In so far as exercise serves this end, it is a necessity for all, except the artist or any other fortunate person whose work and play are one. But in such cases it is not the muscular contraction that matters, but the mental interest. This is not to say a word against gymnastics—excellent for those who like them. It is merely to point out that it is the liking which constitutes the excellence.

There is nothing mystical or metaphysical about this doctrine. Every state of emotion, including mere interest, far short of overpowering delight, influences the whole body. Indeed, all modern psychologists are agreed that an emotion is a state of body, whether or not it be anything more. Thus the pleasure we get out of games has its physical relations in activity of the glandular tissues of the body upon which its health depends, though we have never heard the names of most of them. This is why pleasure is good for us—that it actually means the promotion of our bodily chemistry, the quicker elaboration of the substances that make for life, and the quicker destruction and removal of waste products. If a man can effect all these ends wholly without exercise, as many bedridden people do, for decades on end, often with minds of the greatest activity and serenity—then, plainly, we must take these facts into account when we estimate the importance of exercise. Only remember, *if you will not exercise, neither must you eat*—beyond a surprisingly small amount.

There is nothing here to be said about dumb-bells or Indian clubs or methods of tying yourself to your bedroom door with elastic ropes, or—the Special
height of absurdity—exercises to be used exercises
sitting in a chair. The man to be respected, so far as

these are concerned, is he who buys the apparatus, uses it for a week, and then becomes tired of it. Of course he should become tired of it. He is a man, not a machine.

But there are two special forms of exercise which may be noted, though no one can note their results in muscular bulk. One of these is breathing exercise. The singer has the great advantage of taking this incidentally. Those who do not sing will do well to take it purposely. It is absolutely cardinal that the air breathed be fresh. Five minutes of deliberate deep breathing at the open window is a good discipline for the beginning of the day. It involves practising the elasticity of all parts of the lungs and preventing stagnation of the blood in them. By means of the diaphragm it involves a rhythmical squeezing of the liver almost as a hand squeezes a sponge. This makes for health of digestion and opposes constipation.

The other form of special exercise is abdominal exercise, with particular reference to constipation again. Walking, of course, involves abdominal exercise, but the subject of constipation will do well to perform such movements as twisting his trunk round in either direction without moving the feet, lying on the ground and raising the head and trunk, and also the deliberate indrawing of the abdomen by direct contraction of the abdominal muscles. This effects a very thorough massage and stimulation of the stomach and bowel, and is better than artificial massage by means of the hand. It is more effective, more even, and more natural. Doubtless it is less trouble to swallow a pill, but abdominal exercise is vastly better.

Exercise is of course a form of education, and, as Spencer says, "to prepare us for complete living is the function which education has to discharge." You have to ask again whether you are a body or a soul. If you are only a body, then

Conclusion

you must devote practically the whole of your waking day to keeping yourself in the best possible physical condition; if you are more than a body, however, this is not worth while. You require merely such a physical condition as best serves the mind. We must remember, what is so constantly forgotten, that vitality and muscularity are not one and the same thing. The female organism has greater vitality in general. Women live longer, on the average, they can survive far greater loss of blood than men, and in general their chances of recovery from infectious disease are always higher. These are conclusive proofs of superior vitality in a much less muscular organism. Many "strong men" are really weak. The upkeep of their muscles involves so great a drain upon their vital resources that the influenza or pneumonia from which a weak woman would recover will kill them. They have resistance to mechanical pressure, since that is what muscles give, but they have not that vital resistance which is everything for the body even considered as a machine, since even as such it is not a mechanical but a bio-chemical machine. But it is more even than that, and, as the devotees of Christian Science have proved, if we had sense enough to learn from them, our greatest source of resistance and vitality is the mind. It is therefore by the effect upon the mind that all exercise must, in the last resort, be judged.

THE NEED OF SLEEP

THE question of sleep is one of radical importance, far too much neglected in the present welter of hygienic controversy. Every one knows, practically, how important it is, but it does not lend itself to controversy, nor to the temperament of the fanatic or faddist, and it will never, I suppose, be discussed as the food question is discussed. Yet whilst the most prominent fact about dietetics is the amazing adaptability of the human constitution to almost any dietary scheme that can be named, and whilst mere belief in a diet, or the liking for it, may go far to make it valuable, thus rendering half our controversies foolish—the need of sleep is imperative, and as rigid, almost, as the need for air. Further, whilst it is impossible to distinguish between the man who is taking the best possible diet, if such there be, and his neighbour who is taking the second best or tenth best, no one can afford to have the second best kind of sleep. Failure in this need of sleep strikes at the very root of all our well-being—physical, intellectual, and moral. It saps the source of that energy which makes so greatly for happiness and for usefulness; it interferes with the power of attention, and makes for indigestion and worry—its own potent causes. In acute illness, the question of sleep frequently means the difference between life and death. What sleep is no one knows. The nature of the causes which produce it no one knows. The problem of unconsciousness is probably as insoluble as the problem of consciousness itself, of which it is only the obverse aspect; but for practical purposes we know a great deal about sleep, and there is no more certain hygienic fact than its importance as an essential condition of all health.

The great fact of human adaptation obtains here in some degree. We have seen that it partly obtains even

in the case of breathing foul air, to which the habitual slum-dweller appears to oppose some anti-toxin which he has learnt to make. But apart from varying need at various ages—a variation probably more apparent than real—our possibilities of adaptation do *not* apply, I believe, to the actual amount of sleep requisite, and probably the same is true of the great *apparent* variations in the requirements of different people. Of course, so long as we imagine that sleep can be measured by the clock—as we think that age can be measured by our planet's revolutions round the sun—so long we shall have to believe that one man needs only four hours' sleep and another ten; or that one and the same man, who formerly seemed to require nine hours' sleep, can in time habituate himself to health with six. If, however, as I shall try to show, these measurements of sleep are just about as relevant as the valuation of a symphony in terms of its numbers of bars, we may suspect that if we really could measure sleep (a feat which I believe can be performed only indirectly by observing its consequences), the variations of need between different people or in the same man at different times would be found surprisingly small. It would, indeed, be not a bad working hypothesis to assume that there is a certain quantity of sleep which, for health, given a certain standard of work, we must all obtain, *though it is a matter of wholly secondary importance whether we take this quantity quickly or slowly.* To this point, which involves the explosion of *the* popular fallacy regarding sleep, we must return.

It is easy to state the chief differences in functioning between sleep and waking, and we are probably entitled, when we have done so, to find in them the value of sleep. It is a state of relative rest. The heart beats more slowly, partly because the whole body is living more slowly, so that less rapid change of blood is required, and partly

The
function
of sleep

because the body is horizontal, and the brain at relative rest, so that the chief cardiac problem of the day-time is suspended—the sending of sufficient arterial blood upwards against the earth's gravitation, towards the active brain. The breathing, also, is slower. There is thus, perhaps, a somewhat higher proportion of carbonic acid in the blood. If the lungs and air-passages be not in perfect health, the effect of sleep upon the heart and lungs will show itself in the accumulation of secretions, so that we may cough a good deal when we get up. The glands of the body also work more slowly. Though in the lower animals, and in man when he approximates to the lower animal, sleep and digestion often coincide, it is best that the digestive glands, the stomach, and the bowel—not only as regards their secretions but also as regards their movements—should do little or no work during sleep. Digestive movements in especial are typical disturbers of sleep, and greatly interfere with its depth. The bowel should wake in the morning under the stimulus of breakfast, and should then be given its opportunity of showing that it has awakened. The kidneys also, when healthy, rest during the night. The amount of their secretion during the night should be a mere fraction of that in the day-time, and a disturbance of this rule—only too obvious in its results—demands attention. The voluntary muscles, of course, rest during sleep.

The brain, also—and pre-eminently—is in a state of relative rest during sleep. Wholly at rest it can never be. The speck of nervous matter, for instance, which initiates the act of breathing, and is situate in the lowest part of the brain—the *punctum vitale*, or vital point, as the older physiologists called it—must continue to work, though less vigorously. Its rest, like the heart's rest, is really in the intervals of a very rapid rhythm which persists continuously from the cradle to the grave—indeed, in the case of the heart, from long

before the cradle. Somewhat higher areas of the brain, concerned with motion and sensation, rest much more completely. The only voluntary muscles in action are those of respiration. Though external pressure is still present, its stimuli should not reach the centres for the sense of touch. The hearing, seeing, smelling, and tasting centres are at absolute rest. So also, and this is most important, should be the brain centres for what may be called our internal sensations of touch, those proceeding from movements of the stomach and bowel. If these centres be, however, disturbed, they are capable of arousing the highest areas of the brain, either wholly, so that we wake, or in part, so that we dream. The commonest cause of insomnia is indigestion, and the two states are, indeed, very rarely dissociated. *Hence, it should be criminal to treat insomnia with hypnotics whilst leaving ignored what is its very nearly invariable cause.*

Lastly, in healthy sleep the highest parts of the brain are at complete rest. It matters not in the least to us here upon what physical or physico-chemical state this rest depends, except merely that if it is to depend upon any chemicals they should be compounds made by the body itself for hypnotic purposes; and that if an artificial hypnotic must be used, it should be as nearly as possible identical with the natural hypnotics. It is, of course, in this condition of the highest part of the brain that sleep differs from the most complete waking rest.

It may appear sufficient to indicate the foregoing facts of sleep in order to explain its value, and they do explain its value, no doubt, in great measure, if not wholly, so far as the body as distinguished from the brain is concerned. Thus if we could insure a right state of consciousness, there is little doubt that complete physical rest would do for us almost as much as sleep does. The sleepless man, if he can discipline

his mind, may profit by a night's rest in surprising measure; and it has been recommended, quite rightly no doubt—though it is a counsel of perfection—that the bad sleeper should compose himself, obtain physical rest and be grateful for that; if he avoids worry and fretting and frantic efforts to obtain sleep by storm, he will fare almost as well as if he had sleep. I am sure there is a great deal of truth in this. Given physical rest and a perfectly placid contented state of mind, who can say how little actual unconsciousness would be compatible with health? But of course the truth is that you require to be a very exceptional person in order to obtain such a state as has been described. When we fail to sleep we worry, and worry being an emotional state is an active state of the body, the absolute negation of even physical rest, though the voluntary muscles may be composed enough. For the practical purposes, then, of ninety-nine men out of a hundred, it is necessary to sleep even in order to obtain mere physical rest, internal as well as external, and the true value of sleep, as distinguished from anything short of it is, I believe, simply this: that for nearly every one it is the necessary condition of real, as distinguished from apparent, physical rest—rest not merely of limbs but of internal chemistry, rest in the laboratories of life.

For it must be remembered that the vital processes themselves, so far as their destructive and expending aspect is concerned, are in partial abeyance during sleep. When we sleep we are saving energy. This, of course, is as good as to take in new energy, and the French proverb is undoubtedly right, "*Qui dort dine.*" This, at bottom, is the value of physical rest, and therefore for practical purposes of sleep; since for most men, as we have seen, it is necessary to be actually asleep in order to obtain real physical rest. When we sleep, we cease to spend and destroy; we save

and construct. Think of sleep as the constructive period or re-constructive period. Sleep does for the whole body what the heart does for itself between its beats—absorbs, assimilates, and builds up new material.

We are discussing here the adult man and woman in whom physical growth has ceased. (In the human being mental growth never ceases, at least **Sleep** so long as the soul is alive, but of course **and growth** the soul may die at any time, as we shall see in a later chapter.) But I cannot refrain from taking the opportunity to point out that, as our principles will show, sleep is, in childhood, a period of growth and development. If one limits one's adjectives in trying to express the importance of sleep for the adult, it is only because one should have further verbal resources in order to express its importance to the child. Growth and development are the marks of childhood, and it is in the sleeping child that they proceed. Our treatment of childhood in respect of sleep is at present only too often scandalous, cruel, and disastrous. This is in the nature of a digression in the present volume, and I can only say a word or two. But we know for certain that in the majority of even the public schools of England, where no money is lacking, the parents' fees do not suffice to buy sufficient sleep for their boys. We practise, by proxy, a wicked asceticism in this respect. The boys are turned out of bed often after only eight or eight and a half hours' sleep, insufficient for either boy or girl, and then, as like as not, they are expected to do some brain-work before breakfast. This whole practice is quite imbecile—if, indeed, that adjective should not be reserved for most of its products. The public school boy is not so abused in America, by the way. As regards the children of the poor, from whom in the long run our race is recruited, the question of sleep is still more urgent. A majority of them are terribly

maltreated in this respect—victims of great irregularity and all kinds of noise and disturbance. We cannot say what the mental and physical average of our race is really capable of being until we devote far more attention than any hitherto to the question of sleep in childhood. It is not only growth of limb but also growth and development of brain that occurs during the constructive period of sleep. To eat is only to take in, but to sleep is to build.

But to return to the adult, let us here note at once how this matter of sleep bears upon the principles of the new asceticism. For most of us, whether we can afford it monetarily or not, a warning against physical indulgences is necessary so far as all our senses are concerned, and not least those which are not included amongst the orthodox five, such as the sense of hunger. Where, however, gratification of the senses is not involved, we avoid physical indulgence of the most desirable kind, such as indulgence in fresh air. Similarly, we avoid indulgence in sleep. Most of us are in this respect actual ascetics—not, however, from any ascetic motive. If the results are bad, as they are, we cannot claim any credit on the score of our intentions. Now, if we want to estimate the effects of this kind of asceticism, we have the old asceticism to guide us. The deprivation of sleep was, of course, one of its methods, usually aggravated by fasting. The ill effect of the fasting would in part have been compensated for by sleep. But to practise vigils and fasting too was, of course, to burn the candle at both ends; to increase the physiological expenditure and diminish the income. And we know that the results were disastrous, most copious, perhaps, being all kinds of hallucinations. In those days hallucinations were mostly visual, the eyes being the most over-used organs of sense. In these days, as we shall see later, the ears are often over-worked, and hallucinations of hearing

are probably of unprecedented frequency to-day in association with insanity and insomnia.

Now the new asceticism takes the effect upon the mind as its criterion, and though the value of sleep is, physiologically, to be found in the physical repose it effects, yet it certainly does not follow that sleep is merely good for the body. It is good for the mind because it is good for the body. On these grounds, then, the new asceticism must utterly condemn and repudiate the deprivation of sleep, and must demand the practice of a higher and subtler asceticism which will discipline us to resist the temptation to cut down our sleep. It is bad enough that in the modern world so much disaster should be wrought amongst children, and adults too, because of deprivation of sleep which the subject cannot avoid, without having added to it all the sum of disaster due to voluntary and deliberate deprivation of sleep. Many of us require to discipline ourselves, to abbreviate our bridge and balls and other dissipations, in order to gain more sleep. Never was a greater untruth more wittily expressed than in the couplet—

“The best of all ways to lengthen your days
Is to steal a few hours from the night.”

The truth is that our common defiance of the needs of sleep, and our irregularity in taking it, very commonly result in insomnia, which we seek to relieve by dubious methods; until, at last, the sleep which we formerly refused is now refused us, mind and body paying the penalty. Of all the errors of the old asceticism, there was none more profound and more vicious in its results than the deprival of sleep. This practice on ascetic grounds prevails only in our cruel treatment of school children, and, on economic grounds—save the mark—in that of many young children in the north of England, who are daily awakened by the “knocker

up" between 4.45 and 5.30 A.M. with results for which they and the nation pay. As regards ourselves, the ascetic principle is abandoned in this respect, but for our own immediate pleasure we act as if it were maintained. There does not seem to be any way of checking this course except by trying as often as possible to warn the public against its ultimate consequences.

And now, before we proceed to lay down any rules, and, least of all, any figures, as to the need of sleep, The equality of sleep it is necessary to repudiate one of the most widely credited of all delusions—that all sleep is one and the same, and that it can therefore be measured by the clock. If possible, we must cease to believe that the line of demarcation between sleep and the waking state is as absolute and rigid as it appears. In reality there is an infinite number of gradations between the state of intense consciousness, at the one extreme, and at the other extreme, after passing through many stages of more or less normal sleep, the state of coma, in which perhaps even a bright light thrown into the eye will fail to rouse the patient.

Let us remember that even the waking state has many gradations. Thoreau wonders whether, if we were to meet a man who was fully awake, we should dare to look him in the face. There is also the state of day-dreaming, which approximates to sleep in some ways—at any rate, to that very imperfect sleep which is accompanied by relatively coherent dreams.

What may be called normal sleep similarly varies in depth, and one hour of the best quality of sleep is worth many hours of the worst. Indeed there is, of course, a kind of sleep which does not refresh at all, but the rather exhausts us. Yet it is curious how we Sleep and judge others and ourselves in this respect, dreams as if laziness and strenuousness, good fortune and bad fortune, could be measured by the clock. The question "How long did you sleep last night?"

is not worth asking, unless, indeed, you want to infer from your friend's waking state what kind of sleep he had. Just as people may be more or less wide-awake, so they may be more or less narrowly or deeply asleep; *and the question of depth is far more important than that of duration.*

This, indeed, is where dreams, in these days, find their practical interest and importance. This is where they may still be capable of predicting the future. The man who habitually has coherent dreams, especially if these be repeated, may regard them as somewhat ominous, whatever their subject. Six hours of dreamless sleep will probably suffice for any adult if he can obtain them. By no other means can the quality of sleep be so readily measured as by dreaming or its absence. Best of all is to have no dreams. Some authorities assert that every one dreams, but that many dreams are not remembered. If this be so, then best of all is to have no remembered dreams. Next best is to have few, inoffensive, and incoherent dreams. Less good is it to have definite and well-remembered dreams. It is probably correct to say, I fancy, that the measure of coherence of a dream depends upon the number of brain areas that were in active association during its occurrence. Thus the more coherent your dream, the more of your brain was awake, so to say. Still worse is it to have dreams of the nightmare kind, especially if they recur through the night. The nightmare quality doubtless depends upon disturbance in the abdomen or the neighborhood of the heart, and means that so much more of the body has been in a state of unrest. In general, then, the fewer, the less memorable, the less coherent, and the less offensive are the dreams, the deeper and more valuable is the sleep. The sound and deep sleeper, then, sleeps *quickly*, and may obtain more sleep every night than his neighbour who is more or less unconscious twice as long a time. If we use

such a metaphor as levels of consciousness, we may be able to state a theory of these facts. Thus in the lethargic people who "when fully awake can associate about three ideas per hour at their best, the higher levels are apparently never quite wide-awake; in the sufferer from nightmare—who when awake may be very bright—the higher levels scarcely ever obtain real rest, and their partial action involves the partial and disordered consciousness which afflicts his night-hours."

It may be added that there is a normal variation through the night in the depth of sleep, as has been proved by many experiments made by measuring the intensity of the stimulus required to wake the sleeper at various stages. It has been shown that the early hours of sleep are the most valuable. Our phrase "beauty sleep" is therefore justified. It is the earlier hours of sleep which, because they are the deepest, especially make for health and beauty. As the morning hours advance the sleep normally becomes shallower, until at last we wake, many people having an intermediate stage of consciousness, neither sleep nor waking, during which some narrate wonderful tales to themselves—tales which, in the case of a genius like Robert Louis Stevenson, can be materialised in the daytime. I wish to insist that normally—curious though the statement may appear—the process of waking is

Normal	not merely a gradual one, but is also a
waking	natural one, determined by internal causes.

The universal method of civilisation, of course, is to assume that people have to be awakened from without. The sequence is started by means of an alarm clock, and its victim goes about and victimises others. It is doubtless useless to propose that adults should be permitted to have their sleep out, but I am quite absolutely certain that it is a wicked thing to wake a child. It is beyond doubt an unpardonable crime, except for

the most rare and special and peculiar reasons, to wake a baby or an invalid. The theory of drugging reaches no point so outrageous as when an uninstructed nurse wakes a patient whose sleep is curing him, in order to administer a dose of some poison or other. In general, though there are of course exceptions—I am not referring to the sleep of laudanum poisoning, nor even to the sleep of him who has dined too well—but in general a sleeping person ought to sleep. In health at least he will wake when he is ready to do so, and in all ordinary cases of disease, as in childhood and infancy, this principle is true and all-important. But it depends upon the remarkable assumption, you will observe, that, despite almost universal practice, we may be normally and naturally awakened from within. No one knows at all the nature of the physical state which is involved in sleep, but it is a thousand times probable that whatever it be, it is naturally terminated when the need for it has been met. Observe that when we have had our deep sleep, our sleep normally becomes shallower and shallower.

Recent inquiry has shown that the experience of so many of us is apparently normal, and that, even after obvious waking, we require a few hours before we become as awake as we may be. Most people are not at the “top of their form” in the early morning; it is somewhat later in the day that they become fully awake, and then, after a time, sleepy again. There is thus a daily rhythm which, though it appears to consist of two abruptly marked phases, is really continuous. How smooth and continuous we can probably not guess unless we adopt the practice of going to bed when we begin to feel sleepy and allowing ourselves to awaken spontaneously.

The interesting phenomenon known as the breakfast temper is much less familiar now than it used to be. The symptoms need scarcely be described—a general

feeling of irritation and annoyance, a lack of any delight at the spectacle of one's family, a tendency to The break- growl when asked to pass things at table, fast temper and so forth. The comparative disappearance of this disorder may be attributed to two causes. One, undoubtedly, is the opening of the bedroom window. Other things being equal, you will be more cheery in the morning if you have not been, so to say, stewing in your own juice all night. It is the difference between an unpoisoned and a poisoned brain. This is one of the minor advantages of opening the bedroom window, but it is worth mentioning. Another reason why the breakfast temper is disappearing, is that some allowance is being gradually made for the natural facts of sleep. When the head of the house determined the breakfast hour—probably determined for him by the head of his business house—he forgot that young people need more sleep than old, and his own tendency to bad temper, in part determined by the fact just noted, that one takes some time to wake up completely, was aggravated by the fact that his children were habitually late for breakfast, each of them, of course, having had his or her own sleep artificially terminated. Such a congeries of conditions could scarcely make for a happy breakfast-table. We have not yet reached the stage at which young people are fairly treated as regards sleep, but at least there is a greater measure of individual independence as regards the breakfast hour. Many will deplore this, attaching great value to eating together as a family bond. This theory of the stomach, however, as the family tie is open to criticism, and as yielding to no one in respect for the family, I may suggest that its interests are better served by the abolition of a custom which commonly began the day by setting its members at loggerheads with each other.

There are, indeed, three distinct reasons why we

should throw off the tyranny of the clock in this matter. First, there is the fact that the clock cannot measure the quantity of sleep, quantity being here a question of quality. Sleep and the clock Second, there is the fact that the clock commonly terminates our sleep, though our physical and mental health and temper would be vastly better if we were allowed to terminate it for ourselves. Thirdly, the tyranny of the clock is injurious to the individual and the family at the end of the day as well as at the beginning. What I mean by this is simply that the natural inclination for sleep, and not the clock, should be the natural indication for sleep. It is a cruel thing, and will react injuriously upon yourself, to compel a young wife to stay up in order to entertain your guests. It is no better that the wife should drag the husband away when he is interested, and not ready for bed. The remedy, of course, is evident enough, separate bedrooms for married people being advisable on every ground that can be imagined.

There is undoubtedly a relation between work and the need for sleep. The hard worker should be a proportionately deep sleeper. Muscular work might be supposed to require less sleep, the Sleep and work characteristic of which, as distinguished from physical rest, is rest of the highest areas of the brain. We know, however, that muscular fatigue is in the main nervous fatigue. We know that the by-products of muscular action reach the brain and exhaust it. Sleep is therefore emphatically necessary for the man who works with his hands. Fortunately for him, this kind of work is favourable to sleep. Few of us sleep so well as the peasant who is working in the fields all day.

The brain-worker also needs much sleep—which does not necessarily mean long sleep. But the contrast between the difficulty with which he obtains it, and the case of the hand labourer, suffices to show that man, as

at present constituted, is better adapted for physical than for mental work. There is a risk involved in habitually sedentary mental labour, but it must be run. The point here to be made is that since both kinds of work demand sleep for recuperation, the change from one to the other, though it may be a recreation in some senses, is no substitute for sleep. There is no question as to the value of change of occupation, but this value can be over-estimated or, rather, misstated. We shall deal later with the special precautions useful for the brain-worker, merely noting here that, just as the mental machine requires some time for warming up in the morning, so it is very apt to go on working when its activity is no longer desired. At both ends of the day it is well to recognise in one's practice the graduated nature of the natural rhythm.

In an earlier chapter something has been said regarding the ventilation of the bedroom. The bed itself **Bed and** should be single; the feather bed is out of **bedroom** the question, interfering as it does with personal ventilation, and the rest of the bedclothing should conform to the principles of clothing in general already discussed. There must be enough clothing to permit of the open window. The bed should be wide enough to permit of a fair amount of movement.

He is the happy man who, like the child, does not woo sleep, but is captured by it, and the adoption of **The coming** conscious methods for enabling one to sleep **of sleep** is a very nearly desperate resort. We can, however, lay down certain useful principles which will conduce to sleep. Doubtless most important of all—though purely mental causes cannot be far behind—is indigestion as that which must be avoided. The gastric apparatus is responsible for very nearly all our bad dreams, and for the greater number of all dreams. For nine sleepless persons out of ten, the first need is either to cure dyspepsia or to abolish a late

meal. Doubtless there should be a clear three hours between anything like a heavy meal and the time of sleep. In the course of this interval the stomach should have distributed its contents to the bowel. It need hardly be said that true cerebral stimulants like tea and coffee—and possibly cocoa—should be avoided in the later part of the day by those whose sleep is precarious. Alcohol is a narcotic in its essential action, but it is not to be commended as a hypnotic, either for the young or for the old. The experience of the highest authorities, such as Sir Hermann Weber and Dr. George Keith,¹ whose great age warrants their practice, is entirely opposed to the use of alcohol for insomnia in the old.

Since the mental apparatus takes some time to run down or to cool down, many people find it best not to work at night, vast though the advantages of the midnight hour be for those who can use it with impunity. Many celebrated men have been night-workers. Long habit and obvious advantages notwithstanding, the practice must, however, be immediately suspended if and when the sleep is found to suffer. I know no objection to reading in bed provided that one or two conditions are complied with. The book must be well chosen. Some will sleep best after a trivial book, others after a serious one which may tire the attention. The risk of fire is negligible nowadays when we read by electric light. The light, however, must be rightly placed, so that the surface of the page shall not slope away from the eye. Reading in bed is often objectionable on this account. The book is sloped in order to obtain the light, and the sloping involves extra labour in focussing, and therefore visual fatigue.

In order to sleep, one requires the minimum of stimuli, whether from within or without, to disturb the

¹ Author of "A Plea for a Simpler Life."

brain. Worry and thought offer examples of stimuli arising within; dyspepsia, an example of another kind. Touch sensations often suffice to keep us awake; the feet must be warm, the skin must be warm, but not too warm. When we are too hot in bed the flushed skin

The exclusion of sensation becomes over-sensitive, and sensations derived from it keep us awake. In such a case it may expose one to infection unduly to lighten the bed-clothes. It is much better to get up and sponge the face, or even the whole body, with cold water, and then dry the skin. The removal of perspiration removes the cause of irritation, and very often the process offers a hint to the brain centre which controls the distribution of blood. This method of relieving insomnia due to becoming too hot in bed is very constantly successful.

Sensations of light must be excluded, of course. Morning insomnia is often remedied by the use of "photographic blinds" for the bedroom windows. The visual character of most dreams is quite sufficient to prove to the psychologist that the brain centres connected with vision have been unduly stimulated before they are asleep. I am not thinking so much of mere ocular fatigue in reading or writing, as the effect upon the brain centres themselves. Their congested state doubtless accounts for many visual dreams. We light our living rooms unduly. Almost the only good feature of the modern fashionable dinner is the confining of the light to the table, but the drawing-room is far too brilliantly lit. There is no sense or reason in this at all, and it undoubtedly prejudices subsequent sleep. Where the staple interests are conversation and music, there is nothing in particular to see. When music is taken seriously, the less light there is the better.

The question of noise in cities is becoming a pressing one. We have no ear-lids. In the act of falling to sleep, as in the act of going under chloroform,

the ear is hypersensitive. Ear-strain is, I am sure, at least as real as eye-strain, and probably **Sleep and** more important at the present day. **noise** The noise of cities must be indirectly responsible for much consumption, in constraining many people to close the bedroom window in the effort to exclude it. This noise, however, has equally disastrous results when it interferes with sleep, causing dreams which are auditory rather than visual, and, indeed, in some cases leading to actual insanity, marked, as insanity is being increasingly marked, by an excess of auditory over visual hallucinations. In this connection the simple use of plugs of cotton-wool for the ears is to be recommended. It has no disadvantages, and certainly no one should close his bedroom window on account of noise, whilst neglecting to avail himself of cotton-wool for his ears. Properly made, these artificial ear-lids are highly effective.

A great deal of nocturnal noise can be and should be suppressed in the interests of sleep, so urgently required by modern civilisation—in which, as is now certain, insanity is really increasing. Much of the noise made by railways is superfluous. Continental railways are much quieter than our own. There is no need for striking clocks. They survive from the days when people did not possess watches, and they cause far more noise or nuisance than they are worth. The same applies to all sorts of bells and chimes. There is no excuse or need for the church bell at the present day, and the practising physician knows that it may be an absolute curse to his patients, whom indeed, it frequently hastens into the other world for which it seeks to prepare them.

A distinguished London physician says that he has “of late been much impressed by the numbers of neurasthenics who suffer from auditory hyperæsthesia, or over-sensitiveness to sounds, as compared with tender-

ness of the visual sense." "This," says Dr. Hyslop, of Bethlem Royal Hospital, "is a clinical fact which my own experience confirms, and its significance is manifest and beyond dispute." There can be no question as to the increasing frequency of auditory perversions, and for this there is only one accountable cause, the excessive use and strain of the auditory centres in modern life. Dr. Hyslop thus quotes a French commentator on the noises of London streets:—

"Is there anything to be compared with them in any civilised country? Where, in the whole world, will you find organs so loud permitted to disturb the peaceful inhabitants, who, in the fearful noise, can neither read nor write nor hear themselves speak? Where, in the whole world, will you find milkmen allowed to mew like wild cats or to rattle their cans before daylight, and break the rest of those who have not the privilege of selling milk—so-called; coalmen to bellow like bulls; costermongers and other vendors of rotten fish, putrid vegetables, faded flowers, cholera-giving fruit, and various unsavoury eatables—or, rather, uneatables—to shout their wares with voices that have nothing human, and to poison unoffending men, women, and children?"

The noises made by motor-cars and motor-buses are doubtless of ephemeral importance, depending only upon the primitive quality of their mechanism. A much more permanent nuisance, interfering with sleep, is the noise due to various animals. As to cats there may be some compensating uses, but I see no good reason why the keeping of dogs in a city should be permitted at all. Most of their noise means that they have something to complain of, and, as I have said elsewhere, it should appeal to those humanitarians who will not be moved by the circumstance that it is a curse to human beings. Most of the foregoing causes of noise are beyond the control of the individual, though he helps to form the

public opinion which will remove them. Meanwhile I plead with him for the use of cotton-wool or other ear-plugs, safe, effective, and convenient, rather than closing the bedroom window, with all its manifold dangers. That, I fear, is the only practical suggestion that can be made at the moment as regards the relations of noise to sleep, but simple though it be, it is worth adopting.

It need hardly be said that the many bad sleepers who, as hinted above, have specially sensitive ears, must take appropriate precautions, especially as regards music at night. It might be supposed that with practice they can learn to tolerate what formerly kept them awake, but in point of fact this is not so. They can acquire toleration only by removing the underlying nervous condition, and that is to be effected only by the rest which, however obtained, is the only remedy for neurasthenia. Least of all can a neurasthenic symptom be controlled by any practice which interferes with sleep.

Disturbances from without, however serious though they may be, can commonly be excluded if one takes the trouble, and we may add that, in accordance with man's unique capacity for adaptation, it is possible to accustom one's self to ignore, at any rate in health, almost any external disturbance. The case is very different, however, with the internal causes of disturbance, to which nearly all insomnia is due, and certainly all intractable insomnia. A few points, some of them already alluded to, may be summarised here.

It is asserted that overwork is a cause of insomnia. This I entirely disbelieve. We confuse work, as such, with work accompanied by worry, hope, Sleep and joy—indeed, excitement or emotion of any overwork kind. It is emotion that keeps us awake. What more natural, if we realise what an emotion is? Consider for a moment the facts as regards work, considered

by itself. Let a man undergo intense physical labour for some cause or other, and let it be continued for hours upon end. The normal upshot of such a process is sleep, which may indeed capture him as he continues to work. At any rate, so far as physical work is concerned, insomnia is no consequence of overwork. On the contrary, many a bad sleeper will profit by muscular exercise, provided of course that, as is insisted upon elsewhere, it be exercise with an object—that is to say, a non-hygienic object. Pure muscular work undoubtedly produces chemical substances in which the nervous system is bathed and which, besides interfering with the higher intellectual processes, will, when sufficiently concentrated, produce sleep. In the ordinary labourer this is the normal sequence, and many of us would do well to take a hint from him.

It will be said, however, that not physical but mental overwork is referred to when we hear that overwork interferes with sleep. This also, as so stated, I deny. We have already noted the ways of the intellectual machine—how it requires warming up before it runs well, and how it is apt to go on running for some time after we no longer require it. Thus work at night may interfere with sleep, but you are probably wrong if you put this down to overwork. Rearrange your working hours, and you may get just as much done without inconvenience. This is not to assert for a moment that many people cannot do hard brain work at night without insomnia. But if instead of doing your normal four or five hours of reading and writing—say from nine or ten till two, as is the custom of some one very dear to me—you have occasion to give a lecture to which you attach importance, causing excitement, then, though you have done nothing like your ordinary quantum of work, you may find it impossible to sleep for several hours. It is not the work, but the emotion that has kept you awake. Many a man, then, who thinks he

cannot do brain work at night, and who thus loses many precious hours, can save them if he will allot to this period of the working day the kind of work which does not excite. Let it be something of a dull and routine character. If he is his own secretary he may copy out extracts, compile bibliographies, make cross references, or do such writing as formal descriptions of something already known. Let him avoid the excitement of creative work, on any plane. Best of all, let him read heavy books. If his attention persistently fails, as it will after a time with most people, then he is probably ready for bed. On the other hand, let him do his more interesting, that is to say more exciting, work in the morning; in most cases this will be not before breakfast, but after breakfast and the papers, by which the normal warming-up is accomplished. Such hints as these, of course, apply in detail only to the kind of case I know best, but the hard worker of any kind may profit by them, I think, if he will look to the principle—which is that abundance of work is not in itself a cause of insomnia, that work which causes emotion is best kept as far removed as may be from the time of sleep, but that the common prohibition of mental work at night—a period free from noise and interruption, and therefore valuable—may be ignored by most of us if we relegate to that time work which does not excite. For the student of any order there is enough and to spare of such work, goodness knows, and will be until the art of indexing and compiling references is vastly improved.

But whilst the pleasant emotions are often causes of insomnia, they are as nothing in this connection compared with the unpleasant emotions, Sleep and which do nearly all their disastrous work worry upon mind and body by means of the insomnia which they cause. This is easy to point out, and would be very easy to preach about. I cannot here return to a

subject to which I have already devoted a volume. But it is a great point made if we realise where the difficulty actually lies, since thereby we save ourselves the labour of beating the air. It is also a great point gained to realise that insomnia due to emotion, and especially to unpleasant emotion, can safely be controlled only by removing its cause. The narcotics in general have no field of usefulness in this connection, whether alcohol, opium or morphine, chloral, chloral-amide, paraldehyde, sulphonal, trional, or even veronal. Each and all of these may have its use. The last, certainly, has its place (of course under responsible medical guidance) in the treatment of a *comparative* rarity, the pure insomnia of a hypersensitive brain. But for insomnia due to worry, not less than for insomnia due to indigestion, these drugs are worse than useless, as will be any future hypnotics that may supersede them. I do not know how to make this warning strong and effective enough. The case against these drugs in this connection cannot be overstated. We must return to it.

Just as emotion almost entirely covers the ground as regards the important internal disturbance of sleep belonging to the mental category, so does Insomnia and dyspepsia dyspepsia for the physical category. I say nothing here about pain and insomnia, since there is nothing to be said that the reader does not know, and since that is a matter for the practitioner. Dyspepsia is also a matter for the practitioner. The only service I can perform is to advise the reader of the fact. If you are a bad sleeper, the chances are in favour of dyspepsia as the cause. Now the amateur treatment of dyspepsia is almost as useless as the medical treatment applied by the sixpenny doctor; and that is saying a good deal. Volumes have been written about dyspepsia, and we have still almost everything to learn. The amateur cannot treat this condition.

He can choke the symptoms readily enough, just as the sixpenny doctor can, but that way lies worse disaster. The only way in which to cure anything like a chronic dyspepsia with its attendant insomnia and a host of consequent evils, is by continuous attention to the directions of a good doctor: I do not say by continuously taking the medicines of a good doctor. Your practice is perfectly well known to me, if it should so chance that you are the average reader. In a case like this, even having found your good doctor, you find the taking of his medicine no great burden, but the following of his advice decidedly irksome. One of the reasons which would almost warrant us in wishing for the abolition of all drugs is that this would give the doctor's directions a chance. If you get nothing but directions from your doctor, you will either follow them or cease to consult him. If you get directions and drugs, you make a compromise, favourable to yourself, as you suppose, by swallowing the drugs, which is easy, and rejecting the advice, which is easier still.

All this, it may be said, has nothing to do with insomnia. That is not so. Everything that has to do with dyspepsia has to do with insomnia, and the treatment of dyspepsia is exactly one of those cases where a writer in my peculiar position can serve both the public and the profession by tilting his lance at the drug fetish, and preaching that the doctor's advice is worth all his bottles. Of course, if your doctor has no advice, but only bottles to offer, by this sign shall you know that he should be heaving coals.

It is to be understood then, quite clearly, that though there are hosts of drugs which will procure sleep, their use is extremely limited. In acute insomnia (as, for instance, that associated with some forms of insanity, the insomnia of pneumonia, and so forth) these drugs have a place—to be determined, of course, by the doctor in charge.

Insomnia
and
hypnotics

They do not pretend to treat the cause of the condition, but, by preventing the loss of strength which insomnia involves, they may save the life or the reason. In preaching against drugs, as is so necessary, one must endeavour not to prejudice the reader against the legitimate administration of drugs by responsible persons.

In chronic insomnia the utility of drugs, as every doctor knows, is very small. There exist black sheep in every profession, and there are dishonest or criminally careless doctors who will obtain credit by administering hypnotics in such cases. We shall make an end of such doctors before long, and not least, I believe, by the method of educating the public. In general, then, the doctor will not prescribe a hypnotic in such cases. His business, and yours, of course, is to ascertain the cause of the trouble and remove it, if possible. With this business no hypnotic has any relevance. A friend may hand you a prescription which, as he thinks, served him, or you may be tempted to purchase sulphonal tablets or the like at your chemist's. This is the road to disaster. You may never reach that goal, but that is the road upon which your feet are set.

Undoubtedly the progress of synthetic chemistry is making for the public health in this matter. This is to say that the hypnotics now employed, whether rightly or wrongly, are at any rate not so dangerous as those of some years ago. For the simple hypnotic purpose scarcely any one would now dose himself with opium or any of its products or with chloral. The simple bromides, long known and very safe, are probably quite the least harmful of any hypnotics known but they are not powerful, and one feels it almost unfortunate that if people will make experiments upon themselves, they cannot choose such comparatively harmless drugs as these. Sulphonal was in some way an advance upon its predecessors, but trional is a great

advance upon sulphonal—which, indeed, is now prescribed only through sheer inertia. It can do nothing which other drugs do not do better. Used under doctor's orders, paraldehyde is invaluable in some cases.

The reader must not misunderstand me nor imagine that I am recommending him to help himself, if I refer, on account of its physiological interest, to the latest substantial advance in the use of hypnotics. This is represented by the drug called veronal. Introduced some five years ago, veronal has now passed into general use. If a hypnotic must be used for a simple insomnia unaccompanied by pain, veronal is undoubtedly superior to all its predecessors. The point I wish to make here, however, is that this case approaches, very probably, to an application of the *vis medicatrix Naturæ* in the relief of insomnia by drugs, and thus, in a sense, marks a new stage. The chemist knows that veronal is very closely allied in its constitution to substances which are normally produced in the body in the course of its activity. Recently in conversation, one of the most famous of living chemists, whose name is known everywhere as that of the founder of a new department of his science, told me that for a year past he had obtained good sleep from a five-grain dose of veronal every night, without any ill effect or any need to increase the dose. This result he attributed to the close chemical relation between veronal and natural body products, such as urea and uric acid, and his remarks clearly suggest the possibility of finding a natural hypnotic—if not, indeed, *the* natural hypnotic. Veronal is not normally produced by the body, but near relatives of veronal undoubtedly are. Now in this chapter we have had matters of more practical importance to discuss than the theories of sleep. It can scarcely be doubted, however, that there is a considerable measure of truth in the chemical theory of sleep which suggests that a

result of our waking activity is the production of a natural hypnotic which sends us to sleep. This theory is, indeed, supported by the very fact that a substance closely allied to natural products of our activity is found to be a hypnotic, and not only so, but a hypnotic producing natural, refreshing sleep without ill-effects. It may be hoped, then, that we have very nearly attained the discovery of the natural hypnotic or hypnotics which must almost certainly exist. Furthermore, we may suspect, I think, that while some cases of insomnia (as, for instance, those due to pain or worry) do not depend upon a lack in the normal production of this substance, yet other cases—especially those where the brain without obvious cause, internal or external, remains wakeful—may actually be due to some peculiarity in the bodily chemistry, whereby this unknown but very probable substance is lacking. These are the cases in which veronal, responsibly administered, is notably valuable, and these, perhaps, are the cases which will be still better relieved by the natural and ideal hypnotic of which veronal seems to foreshadow the discovery. This, of course, is a mere speculation, but is it not interesting? Does the reader demand an apology?

As every one knows, elderly people commonly have less sleep than they had when they were younger. It is usually asserted that elderly people *require* less sleep than they used to, and it may be admitted that this change in sleep with age is probably normal, in the same sense as that in which senility and death may be, though they so rarely are, normal. In his admirable book "The Hygiene of Mind," a leading authority, Dr. T. S. Clouston, avoids committing himself on this point. Speaking of the decadent period, he simply says, "Sleep tends to change in character and to diminish in amount at this period. It is not so deep, it is more dreamy, and there is often

wakefulness earlier in the morning." The question must be asked, however, whether this diminution of sleep is not, in great measure, a cause of the decadence of mind and body; that is to say, may it not be that senility, whether premature or normal, really consists in nothing other than a failure of the power of recuperation? If we could always make good our losses, should we need to die? There can be no question whatever that the answer is a negative. The time comes, however, when we do fail fully to effect the processes of repair, and then we go downhill. On such a view it is not correct to say that old people require less sleep. If only they could obtain it, with all that it means in the way of recuperation and compensation for waking loss, their lives would be much prolonged. Do we realise the extraordinary longevity of many vegetable persons of slow mind who are, so to say, more or less asleep nearly all the time?

It may be granted that the elderly person appears to suffer little or not at all from a lack of sleep such as a younger person, and especially a growing child, would be gravely and obviously injured by. And this is the fact, of course, which leads to the statement that old people require less sleep. Nevertheless I counsel them to take what they can get, and even to be at some pains to see that they get all they can.

And here this chapter may conclude with a piece of advice specially applicable to elderly people, but relevant to all cases. It is that if you cannot sleep, if you know by experience, let us say, that, waking up in the morning unduly early, you have no hope of more sleep, then abandon futile endeavors to get the impossible. In the first place, sleep is coy, and, like the maiden, cannot successfully be wooed with unabashed front or by direct assault. In the second place, to worry about lack of sleep, to toss and turn and try, and toss and turn and try again, is to remove

yourself so much further from the state of rest which you desire. All emotions are costly in life and energy. It is far better to cultivate a little philosophy if you can. If you cannot sleep and must do something, by all means read. It costs you far less in life frankly to give it up, and read at your ease, than to knock your head against the stone wall of your pillow. Better still, but much more difficult, is the practice commended and followed by Dr. George Keith and by some other sensible and self-controlled people, who achieve the triumph of lying quietly in bed for hours at a time when they should be asleep, placidly and happily, when you or I would be worrying, disgusted or furious. If a man, lying awake in bed, has muscular rest, sensory rest, and emotional rest, he is, I fancy, not very far from profiting as much as if he were asleep altogether. But if you cannot attain this second best, take the third best, which is some quiet and satisfactory occupation, rather than the worst, which is to exhaust yourself in the fight for repose. This is as profitless as the case of the Irishmen "fighting like devils for reconciliation."

The time will come, probably this century, when we can all emulate the fortunate few, like Napoleon, and sleep at will. Possible for some, there is no reason why this should not be possible for all. We who can measure the stars will some day master our own minds.

CONCERNING DRUGS AND DRUGGING

"I firmly believe that if the whole *materia medica* could be sunk to the bottom of the sea, it would be all the better for mankind and all the worse for the sea."—OLIVER WENDELL HOLMES.

THE chief objection to the taking of drugs, in general, is its tendency to perpetuate the delusion that man exists in order to keep his body well. No Modern less cogent on other grounds are the drugging reasons which led Professor Osler, quite recently, to remark, about half a century after his illustrious fellow-countryman whom I quote above, that he is the best doctor who best knows the worthlessness of drugs. Never since time began was the warning more necessary. The vile and obscene compounds of former days were at least offensive and difficult to obtain. To-day manufacturers vie in the effort to turn out drug preparations of the most attractive, elegant, and tasteless kind, scarcely less tempting than sweetmeats, whilst the press derives a large amount of its income from advertising them. Never before was there so much self-drugging. The enormous sums spent on advertisement, and the experience of retailing chemists, abundantly suffice to show the enormous quantity of drugs of one sort and another which the public stomach daily consumes. The composition of all these nostrums is easily ascertainable. They contain no remedies not familiar to the doctor, and the profit on their sale is colossal. Many of them contain most undesirable drugs which act upon the nervous system, from alcohol and opium to the various modern hypnotics and deadeners of pain. In the whole armoury there is scarcely a drug that can possibly be described as curative in any sense at all. Many of them modify the symptoms of disease; and any of them, if and when they are adequately believed in, may cure certain disorders, just as so much water or burnt sugar would in the same conditions,

the patient's faith making him whole. On the other hand, it is beyond doubt that they do incalculably more harm than good, and do it at an enormous monetary cost.

My general advice is, avoid them all as you would poison, which they are. The whole foolish business is a survival from primitive superstition, and merely suffices to show how much primitive credulity and love of magic survives in modern man. It is quite easy to avoid the imbecile habit of self-drugging, so readily approved by the man who would not dream of attempting to repair his own motor car, which is as simple as a pin compared with the human body: but it is a most difficult matter to break the habit, and when the drug belongs to the class technically called neurotic, its chains are almost unbreakable. Pass them by, one and all, and spare your purse and your protoplasm.

So far as the practice of self-drugging is concerned, all sensible people will agree; but most of them will consider the case totally altered when the drug is prescribed by some one who knows what he is doing. But the trouble is that he does not know what he is doing except in a few cases. The man who knows most about drugs is the man who uses them least, and the man who uses the largest number in one prescription is the man who has the smallest right to use any at all.

In order to give the utmost force to the argument it is well to realise that, whilst it would be strong enough if based merely upon a recognition of the continuance of the ignorance of our ancestors in these matters, it is far stronger when based upon our present knowledge.

That was a right gibe of Voltaire's concerning the physician of his day, who poured drugs of which he knew little into a body of which he knew less; but though it is fair to remember that neither pharmacology—which is the scientific

study of the action of drugs—nor anything really fit to be called physiology was in existence in Voltaire's time, yet the argument against drugging is not weaker now in consequence, but stronger.

Generally speaking, we may say that before the dawn of Pasteur the causes of disease were unknown. Here was an ill man whose malady showed itself in certain symptoms—as, for instance, pain and fever. In the absence of any recognition of an underlying cause, these symptoms *were* the disease, and to remove them or smudge them over was to cure the disease.

On the other hand, the fields sustained various plants, the leaves or roots of which would also cause unusual symptoms of various kinds in one who swallowed them. The dried juice of the poppy capsule relieved pain and sleeplessness, amongst the most distressing symptoms of illness, and the leaves of the foxglove or digitalis would retard an unduly rapid pulse. These are instances which explain the long practice of what we may perhaps call vegetable therapeutics—a practice which, except for a very small and continuously decreasing number of drugs, is drawing to a close.

Now I wonder whether there has ever occurred to the reader what occurred to me on my first day in a class-room of materia medica—that there is no particular reason why the vegetable world should provide substances specially fitted to relieve the maladies of that remarkable animal—the living body of man. The plant has its own life to live, its own enemies to outwit or repulse, its own kind to perpetuate. “What's Hecuba to him, or he to Hecuba?” If I have neuralgia or the heartache, that is really my affair. I have no more reason to expect help from the foxglove than the foxglove has reason to expect help from me in *its* little difficulties; and if it be true that the foxglove will relieve my heartache—as indeed it has relieved many millions of heartaches—it is equally true that a slight

miscalculation of the dose, only to be learnt by experience, will put an end to my heart's activities and aches once and for all. In other words, to state the matter more gravely, there is no good reason, let alone any inherent necessity, why the active medicinal substances found in the vegetable world should serve ailing man. Indeed, so far as I can judge, the probabilities and the facts are all the other way. In the first place, when the botanical physiologist seeks to explain the function of these so-called medicinal substances in the plant, so far is he from suggesting a service for man, that he inclines to describe them as protective against the animal world. The delicious volatile oils which furnish the finest odours are probably produced by the plant in order to warn off, or to destroy, if they approach, objectionable insects; and a nauseating leaf does not constitute a thoughtful vegetable anticipation of the occasional emetic needs of man, but a means of ensuring that the animal who seeks to make a meal off such a leaf shall studiously permit the tobacco plant, let us say, to grow in peace for the future. Secondly, it is the actual fact that the overwhelming proportion of animal diseases—and of course man is distinguished as pre-eminently the animal who is susceptible to disease—are due to the attacks of vegetable organisms, seeking life in their own way as he in his. Such considerations, then, might well lead any one to express an *a priori* doubt whether the vegetable kingdom could provide, in general, any very potent means for relieving the maladies of man; and indeed, when the matter is put to experiment, we find that there is—I believe I am correct in saying—only one human malady, or at any rate only one of any importance, for which the vegetable world provides a cure. Indeed, the cure of malaria by quinine must be regarded as a chance fact; it just “happens” that a particular substance, produced for its own purposes by a particular plant, ar-

rests the chemical processes which serve the life of the animal parasite of malaria. It is the magnitude of this exception that points the rule—the rule which may be described as the irrelevance of vegetable chemistry to the diseases of man. So far as I am aware, these considerations are novel, but I believe them to be reasonable. We are all prepared to talk glibly nowadays about “removing the causes,” whether in individual or social pathology, but this very proposition amounts to an *a priori* condemnation of what we may call the vegetable therapeutics, for the simple and sufficient reason that there is only the very remotest of conceivable connections between the chemistry of some particular leaf and the cause of your malady or mine.

Here, of course, is the explanation of the fact that, of all the thousands of vegetable drugs that have been employed, there is scarcely more than **The failure** one which has a specific curative action **of drugs** upon a human disease. The chemistry of the vegetable world is, so to speak, *irrelevant* to our needs; the chances were many thousands to one against the occurrence in vegetable chemistry of any substance that happened absolutely to fit the needs of any particular disease—and but for the beneficent alkaloid of the cinchona bark, we might have declared that the chances against this fortuitous fitness were as infinity to one. Evidently the chances are not so adverse to the existence of vegetable substances which affect, in one way or another, one bodily function or another, and which therefore may, on occasion, relieve this symptom or that; and it would be absurd to deny that morphia and strychnine and atropine, though they cure no disease, are of great service in medicine; but the fact remains that these influences are, of necessity, fortuitous, and the discovery of the causes of disease—which are in nearly all cases minute vegetable organisms—has at

the same time displaced the vegetable kingdom from the proud place which it has hitherto held in the pharmacopœias of barbaric and civilised peoples alike. Vegetable drugs still outnumber all others many times over in the list of materia medica, but every student knows that hundreds of them might be permanently forgotten without any one ever being a whit the worse, whatever his plight. Two striking instances will suffice to illustrate the trend of modern therapeutics. Not so many decades ago, one of the most common and terrible of all diseases, syphilis, was regularly treated with sarsaparilla. This drug is now totally discredited in that connection; nay, more, the most delicate experiment has failed to show that it is capable of exercising any kind of influence whatever upon any function or organ of the animal body, whether in health or disease.

A second instance is furnished by arnica, long thought, in the form of an alcoholic tincture, to be a specific for bruises. It is now known that, if the arnica be omitted from the tincture, the mechanical action of the alcohol and the contingent rubbing completely achieve the good results with which the entirely inert arnica was formerly credited.

It may be added that the likelihood of any therapeutic discoveries of any moment in the vegetable world is exceedingly remote. In the first place, the chances, as we have seen, are entirely against such discovery in a quarter which, as we understand, is inherently unpromising; and, in the second place, the most exhaustive research of the past few decades has failed to accomplish anything worthy of mention.

Alcohol is a drug of vegetable origin, which in former ages was regarded as a panacea. This *aqua vitæ*, however, is now known to be an *aqua mortis*. There was no inherent probability that the product of the action of a low vegetable organism upon sugar should be of service to man in his need. On the contrary,

most of man's gravest needs in disease are actually due to the poisonous action of other substances produced by the vegetable organisms closely related to the yeast plant. Alcohol was long regarded as protective against tuberculosis, the most deadly of all diseases; we now know that, as one of the greatest of French physicians has said, it "*fait le lit de la tuberculose.*" This most celebrated of vegetable drugs, regarded with superstitious reverence from the earliest ages, and more widely praised than any of its rivals, is now known to predispose to disease of all kinds, and to cause many diseases of its own; and recent critical inquiry, involving comparison between cases of pneumonia, typhoid, &c., in which alcohol is used, and those in which it is not, seems quite clearly to demonstrate what was always probably *à priori*, that the medicinal use of alcohol in the acute diseases which it has so long been supposed to relieve, is frequently the factor which turns the scale against the patient and determines his death.

In short, if the exception of quinine be excluded, it is safe to say that for every patient whom a vegetable drug has cured throughout the whole history of medicine, millions have been killed. I do not doubt that this proposition would remain true even if the awful history of alcohol were ignored.

If now, remembering the old game, "Animal, vegetable, or mineral," we turn to what we may call the mineral world, which supplies a certain number of drugs, we find the same state of things. Iron and mercury have their indisputable uses, which, in the case of the latter drug at any rate, are a matter of chance in the same sense as the relation of quinine to the parasite of malaria is a matter of chance. Typical of the decadence which is befalling this kingdom of drugs is the case of antimony, which was popular for so long, and which must have done many a poor sufferer to

death. I am not prepared to quote any statistics, but I will wager that the number of practitioners under forty—or of soft-arteried practitioners over forty—who use antimony once in a decade, might be counted in tens, if not in units.

What, then, of the animal kingdom? Notoriously the practitioners of centuries ago included many substances of animal origin in the un-therapeutics mentionable messes which served them for drugs. Behind all this superstition and ignorance, however, there was a reasonable principle obscured—the principle of what, to adhere to the terminology already employed, I may call the *relevance* of animal substances to the diseases of an animal. Consider the old case of wandering about a field or shrubbery, picking out a leaf of some quaint shape more or less suggesting an animal organ, and using decoctions of that leaf for maladies of that organ, according to the doctrine of “signatures”; consider the really pathetic naïveté with which such an accident was accepted as written advice, and contrast that utter irrelevance with, for instance, the case of cretinism and allied maladies. These, which include kinds of imbecility hitherto absolutely hopeless, are due to defective production of certain chemical bodies by a small gland called the thyroid, which lies close to the voice-box. Administer thyroid gland to the cretin child and it becomes educable, intelligent, human. The drug is relevant.

Or, again, take the other therapeutic triumph which was achieved in the last years of the nineteenth century—the antitoxin treatment of diphtheria. There is produced in the horse, possibly from the white cells of its blood, a specific substance which neutralises the poison of the diphtheria bacilli, and which is produced by exposure to that poison, and by that alone. Given to a choking child, this substance saves its life. Contrast its relevance with the hopeless irrelevance of this,

that, or the other infusion from China or balsam from Peru. As workers daily elucidate the real causes and nature of disease, so the domain of really respected drugs is being steadily narrowed down to a certain number which, to adapt Milton, are fit and fine though few. The total number of diseases, properly so-called, considered from the point of view of their causation, is very small. There may be hundreds of names denoting as many diseased conditions, but these may be really no more than varying effects of, let us say, alcohol—this said alcohol, as we have hinted, being a vegetable drug, and the greatest material curse of our species. Now, as there are really few diseases, though countless symptoms, so there need be but few drugs that really cure. Evidently it would be quite sufficient if, for each disease, there were just one substance which interfered with the causal chain. Thus the tendency of the pharmacopœia is really from the many and generally useless to the few and fit. As long as all the maladies due to thyroid insufficiency were not understood, hundreds of drugs would be used to combat them, and every new one would be welcomed for its possibilities. Reduce all these maladies and their symptoms to thyroid insufficiency, and instantly you sweep away a shopful of irrelevancies with a single relevant substance.

Thus I would ask the reader not to be misled by such a phrase as "the decadence of the drug." Thyroid extract is of course a drug; the diphtheria anti-toxin is a drug, and so are certain ferments of animal origin whose hour of triumph is near at hand. I should have done no service to any one if the thesis of this chapter were cited in favour of the countless quackeries which subsist upon the asserted failure of traditional medicine. It is wholly untrue that the most competent physicians use no drugs nowadays; it is wholly untrue that such physicians have no longer any faith

in drugs; on the other hand, it is true that where their predecessors used scores of drugs, such physicians will scarcely employ more than a dozen. Nor would it be anything but folly for me to protest the decadence of the drug when the attention of all men has repeatedly been directed to the triumphs of antiseptic surgery. Historically, modern surgery is the triumph of a drug—carbolic acid; but it was a relevant drug, deliberately selected because of its known poisonous action upon the microbes which cause surgical inflammation. Our phrases, then, must be chosen with circumspection; indeed it is not the decadence of the drug that I seek to describe, but the decadence of *drugging*. That expresses a real distinction. If we include amongst drugs, as we must, the whole series of antiseptics, anæsthetics, antitoxins, and substances of animal origin, then, certainly, the present age of medicine displays what may properly be called the triumph of the drug.

Pari passu with this evolution in scientific medicine, there has developed a lamentable degree of self-drugging amongst the community—perfectly trivial, of course, in comparison with the drugging by alcohol, which we do not always so accurately name, but nevertheless worthy of consideration. I am of opinion—perhaps because I am inclined to magnify my office—that the true means of opposing this evil, as in the case of alcoholism, is by education, by insisting whenever it be possible upon the danger of these things. “Fear,” said Burke, “is the mother of safety,” and the wise man lives a charmed life amongst the host of poisons which offer him present gratification or ease, and slur over the future payment as did Mephistopheles with Faust, for the excellent reason that he is afraid of them. We all must fear something. The fool fears the phantasms of his own foolish imagining, and the wise man the truly fearsome. There, so far as this

potent and universal emotion is concerned, is the difference between them.

It lies with the teachers of pharmacology, *materia medica*, and the whole subject of drugs in general, to initiate, when they please, a great reform in medical practice. At present these teachers, with but few exceptions, consider it necessary to allude, at least, to practically every drug contained in the pharmacopœia of the country in which they teach. But they know perfectly well that far more than half of these are mere survivals from the pre-scientific age, the very existence and accessibility of which promotes unscientific and meddlesome and frequently deadly medical practice. There needs great revision of the common medical curriculum in this respect.

Let me conclude by indicating, very briefly, the prospects of treatment by drugs in the future. The old-fashioned drugging is already discredited, The future and no scientific physician now writes the of drugs sort of shot-gun prescription with which so many of our forefathers were peppered and slain. We recognise now that any drug must be regarded as a poison until the contrary is proved: and even invaluable drugs like quinine are poisons essentially. Prof. Metchnikoff has lately commented with force upon the fact that even this drug paralyses the white cells of the blood, and every physician knows that it is a neurotic poison as well. Knowing what drugs in general are, you cannot very well write a prescription with a dozen ingredients in the hope that one, at any rate, will hit the mark. For what are the others hitting meanwhile? Fit and few, plainly, must express the future of the pharmacopœia.

As to the source of drugs, the vegetable kingdom is substantially exhausted already, and with results which, after all, are miserably scanty, simply because there is no reason why they should be otherwise. The

same may be said of the mineral or metallic source of drugs.

The future belongs, so far as the ideal hypnotic, the ideal anæsthetic, the ideal antiseptic, the ideal anodyne, and so forth are concerned, to coal tar and synthetic chemistry, which will take the hypnotic fragment of one molecule, combine it with the stimulant fragment of another molecule, and so produce a non-depressant hypnotic, for instance.

But, so far as the actual cure of disease is concerned, the future belongs to the animal kingdom, so long neglected. And, after all, can we who speak of the *vis medicatrix Naturæ* be surprised at this? The curative power of Nature is effected, in the animal body, by animal substances: the thyroid gland will cure or prevent cretinism, the white cells of the blood produce substances that destroy microbes, and so on. The new therapeutics simply take the hint from Nature, and applies with intelligence the substances with which she has been preventing and curing disease since pain and death first came into the world.

The object of all this dissertation is to strengthen the remarks made at the outset, by showing that, from the nature of the case, the drugs which so many of us now consume are incapable of curing our disorders, and can, at most, do no more than mask them. Let the reader be specifically warned against all drugs which contain opium, morphine, or alcohol, whether openly, as a few do, or secretly, as many do; and against cocaine; against chloral, trional, sulphonal, paraldehyde, and even veronal and other hypnotics; against antipyrin, antifebrin or acetanilid, phenacetin, and chlorodyne. The results of taking these things, none of which is a *cure* for any known disease, are only too often horrible in the extreme; and their nature is such that the only safe course is not to begin their use. These drugs attack the centres of self-control or inhibition,

and there is little help or hope when these are captured.

It is possible for doctors to gain the temporary gratitude of their patients by the use of these things, but the risk of prescribing them is one from which the conscientious practitioner must always shrink. They have their uses, as arsenic and prussic acid have, but it is really more necessary that their employment should be limited and under responsible control than in the case of these two notorious poisons. This is not at present the case: but I would have almost all these things scheduled poisons, which they are, and prescribed as such. It ought to be impossible to repeat such prescriptions without the doctor's order, and absolutely out of the question that the prescription should be handed from one patient to another.

The really curative drugs are of the body's own making, and they are not to be obtained at a chemist's shop, with an exception or two, such as thyroid and digestive extracts. We are only beginning to isolate these drugs, and little enough is known about them. But the greater part of this book is nevertheless really concerned with their production and employment in and by the healthy body. The reader who attends to the chapter on fresh air is favouring beyond a doubt the conditions under which the protective and curative substances are manufactured, dispensed, and administered by and in his own body, which is far and away the wisest and most accomplished of manufacturing chemists, far superior to any doctor in the diagnosis of its diseases and their treatment.

A word must be said here regarding patent medicines, for a leading principle of this book is to teach the reader how to avoid poisons, and these, Patent like drugs in general, and like the gases of medicines foul air, and the products of over-eating, fall within the category. Whether or not this book will come

under the eyes of the patent-medicine-consuming public I cannot say, but I hope so; for it is high time that the classes of small means and education should have better guidance in this matter than is afforded them by the advertisement columns of the popular press. The consumption of patent medicines is difficult to estimate, but is certainly gigantic. The outrageous sums for which these compounds are sold are clearly indicated by the magnitude of the advertising which their proprietors can afford and which is all paid for, of course, out of the hard-earned money of the people who consume them. In a recent lawsuit it was stated that certain most familiar pills, which are composed of aloes, brought in an income of eighty-thousand pounds a year. I note, in passing, that no patent medicine proprietor in the world is possessed of any secret, or uses any drug not well known to honest pharmacy. Any one can at any time, by reference to the medical papers or to various little books on the subject, ascertain the exact composition of any patent medicine in the market. It is interesting, also, to have such information as this, "Sold at 2s. 7 1-2d.; average cost of materials, one-fifth of a penny." It will be observed that this leaves a certain margin for the vendor. It should be made a statutory requirement that the composition of these things be stated upon every box or bottle. I do not know how the gorge of any humane and honest man can fail to rise when he considers how thousands of poor consumptives, who need every farthing they possess for the purchase of pure milk and the obtaining of pure air, are spending their shillings on somebody's "lung tonic," let us say, which is absolutely worthless, and probably worse than worthless. Yet this sort of thing goes on everywhere and the writer, like myself, who is allowed a free hand in all other directions by any number of editors, cannot gain a hearing on this subject, because "the paper

must live," and the advertisements of these liars and thieves are indispensable.

Let us endeavour to state what can be stated in favour of these things. In the first place, by inducing the foolish to disburse enormous sums for advertising purposes, they enable the wise to obtain their journalistic reading at much less cost than would otherwise be involved. In so far as this reading is instructive and wholesome, this is to the gain of the sensible at the expense of the foolish, and is so far not wholly to be condemned. Again, several of these preparations do aid the public in the discharge of its duties to its alimentary canal. If there were no constipation, the greater part of them would cease to exist. The price paid, however, for this boon is monstrous, not only in money but also in many other ways.

Then, again, these drugs, like anything else, may do wonders if they are fully enough believed in. They owe to the influence of suggestion such reputation as they do not acquire by the aperient properties. Here, again, however, the cost is outrageous.

On the other hand, there are the gravest disadvantages. I have alluded already to those drugs which have narcotic properties, in virtue of containing alcohol, opium, etc.; and too hard words cannot be spoken of these. But even the others are noxious. It is possible that one or two aperient drugs—such as *cascara sagrada*—most skilfully employed in frequently repeated and small doses, may be really tonic to the bowel, and so may remove the occasion for their use. This, however, is not to the interest of the vendor, and it may safely be said that none of the patented aperients on the market are ever so employed. On the contrary, they make the actual condition of the bowel worse, and may frequently lead to the production of hæmorrhoids or piles, from which such a large proportion of the community suffer.

Again, as I have said, they divert to useless purposes the money of poor or at any rate not affluent people, who need all they possess for obtaining the conditions which will enable nature to cure them.

Lastly, the advertisements of these drugs produce by suggestion far more maladies than the drugs themselves relieve by the same means. I have in my mind, for instance, a familiar picture of a man holding his hand to his back, wherewith the public is informed that pain in this region is characteristic of kidney disease, and demands the use of the remedy advertised. This is a lie; kidney disease is not marked by pain in the back or the kidney region, except in the relatively rare cases of stone, for which no drugs can do anything. Every medical student in his turn is reproved for stating—as a guess—that pain is a symptom of Bright's disease. The advertiser has simply discovered that pain in the back is a common disorder, and trades upon this fact. Apparently various poisons have a tendency to accumulate in the *muscles* of the back—outside the skeleton, and not in the abdomen at all—since the circulation is somewhat difficult here owing to man's adoption of the erect attitude and the influence of gravitation when we lie in bed. Hence almost every woman suffers from pain in the back at times, and very many men. This is a symptom of the poisoning we call lumbago, and of many other poisonings, such as influenza. The advertiser tries to persuade all such persons that they have diseased kidneys, and sells them aperients at some hundreds of times their cost price. It is an abominable trade, involving not merely what is really theft or the obtaining of money under false pretences, but also the production of a host of symptoms by suggestion in many people, whose lives it consequently makes miserable. If the reader cares to observe, he will soon discover that the symptoms described by all these advertisers are just

those which can be most readily induced by suggestion, and those which most commonly spring from the minor poisonings to which we are all liable. Perhaps the people with money are made for the people without, as the Tichborne claimant said; but perhaps the present century will see an end of this pest in all civilised communities. Not least on this ground do I welcome the present tendency of scientific medicine to discredit drugs. Very soon the only people who do not believe in drugs will be the doctors, and after that the public may be expected to become imbued with this true medical belief, just as, in past times, they have accepted all the rubbish which doctors used to believe. If the reader persists in taking patent medicines after reading this chapter, either I am an incompetent writer who should be heaving coal, or he is an incurable fool.

Since this chapter was written, another new drug, or more probably another new name, has been put upon the market, and has been advertised in column-long articles in most of the leading London papers. It professes to be a "Cure for Neurasthenia," and "Prevents Nerve and Brain Exhaustion and Decay." The proprietors profess to have found, in consequence of a "German physician's remarkable discovery," an extract of the "brain and nerve-building constituents of a quantity of foods, the mere bulk of which would otherwise preclude their ingestion, let alone assimilation"; and a diagram is printed which shows the minute proportion of this wonderful substance which is contained in ordinary food. The whole of this is probably arrant nonsense, but this is not my present point. The advertisement includes what I regard, and will therefore describe, as an absolute outrage upon the public—a "pathological map of the victim's degeneration." This map consists of a series of stages, showing the development of neurasthenia. Stage 1

is sensitiveness or nervousness; 2, restlessness; 3, irritability; and so on, through "insomnia" and "inaptitude for steady work," to "paralysis" and "mental derangement," item 16, and last, being "Suicidal tendency." The advertisement adds that "the cases of 'Suicide while of unsound mind' and 'Death from unknown causes' . . . are alarmingly common manifestations of the development to advanced stages of 'cerebral asthenia and nervous asthenia.'"

One could only be justified in giving any further publicity to this kind of thing if one could, as I can and do, declare that it is a piece of monstrous rubbish. It is astonishing that any responsible person can be so thoughtless as to permit this sort of thing to appear in a print for which he is responsible. Only thoughtlessness, surely, can be to blame.

It is no less than criminal that suicide should be suggested as the natural termination for the man who finds in himself a tendency to sensitiveness or inaptitude for steady work. No one who knows the influence of suggestion will question this opinion. An advertisement of this character could not be surpassed for its capacity to predispose towards, if not actually to produce, the very evils for which it professes to offer a remedy. I think this is, without exception, the most disgraceful advertisement I have ever seen. Even the brutal purveyor of a secret cancer-cure cannot cause cancer by it. If the supposed remedy in question had fifty times the virtues alleged of it (which are doubtless far more than fifty times in excess of the facts) these advertisements would do far more harm than the drug would do good. It is a nice comment on the intelligence of the age in which we live, that morbid suggestions of this absolutely inexcusable kind, not stopping short at suicide, should appear in the public press, probably without any consciousness of their evil on the part of those who are responsible. It is outrage enough when

drug advertisements are designed to create minor nervous disorders which any drug by suggestion may probably suffice to relieve. But the case in question exceeds anything of the sort, and it is high time that some one should brand it for the dangerous and criminal swindle that it is.

One may note in passing that the only real remedy for neurasthenia is rest. If special drugs or food preparations can help, as they sometimes can, this primary requirement must first of all be complied with; and secondly, the substances employed must amount, in effect, to the administration of the elements of milk, incomparably the best food for neurasthenia,—if not, indeed, for every other state of disease or health that can be named. If the reader desires to distinguish such preparations, let him note whether or not their composition is stated. If it is, he must further judge of its value; if it is not, any further inquiry is superfluous.

The forenoted advertisement proves to have been an encouragement to others. As the proofs of this book pass through my hands, the following outrageous and criminal advertisement appears in the London press. Three large headlines run as follows:—

“THE WORST DISEASE IN THE WORLD

Kills and Drives Mad more People than any other
Form of Illness

The Awful Agonies of Nervous Debility.”

We are then informed that neither cancer nor consumption nor leprosy, but nervous debility, is the worst disease in the world. Further, that often we suffer from it and yet are quite unconscious of the fact. It

is the most lingering, most torturing, and most painful disease in the world. Various familiar symptoms, from which everyone suffers at times, are then quoted. They are described as premonitory warnings of a disease "which, if neglected, probably ends in one of three things: (1) Imbecility; (2) Insanity; (3) Paralysis and Death."

We are then told that "one of the greatest specialists on mental and nervous diseases says about this fearful complaint:—

"I have seen around me, in my daily walks, thousands of men and women with the portents of coming madness or paralysis on their faces. In the omnibus, in the railway carriage, everywhere I go, I meet these victims of the strenuous life with the premonitory symptoms of dementia, paranoia, melancholia, locomotor ataxy, paralysis, and other forms of mental and nerve disease. The slightest shock would kill them or send them to the lunatic asylum. Already our mad-houses and epileptic hospitals are crowded with the victims of that terrible modern disease, nervous debility, which is so contemptuously ignored by the multitude."

This specialist is of the same order, one observes, as the gentleman who, in a recent celebrated trial, did not know whether Argyll-Robertson was one person or two. In this particular case drugs are not of much value, we are told. "Only electricity can infuse actual new nerve force into a person." We are to write at once for a book "crammed from cover to cover with the most sensational matter." "No one need despair except those who have actually reached one or more of the three final stages of the disease—imbecility, insanity, or paralysis."

What adequate comment on this false and brutal advertisement is possible? It even surpasses that already quoted, and as I do not see how this form of crime can further go, I put it on record here. Except

in the description of the book which the advertisers supply, the thing is a series of the grossest lies from end to end, and the only adequate punishment for those responsible would be branding on the face and public exposure for the rest of their lives.

THE QUESTION OF ALCOHOL

It is now necessary to offer the reader a long and purposely detailed discussion of alcohol. This may possibly not win his gratitude; he may think its length disproportionate, its place premature, the treatment too contentious. Nevertheless I believe its statements to be true and momentous, and have tried to "gild the philosophic pill" with a certain amount of physiology, the interest of which can scarcely be denied. There is, at any rate, an intentional compliment to the reader involved in the disputatious pages that are to follow. It is assumed that he is a rational man of the twentieth century, who has long ago abandoned the always dangerous practice of accepting dogmas—theological and medical too—on authority, and that he would feel insulted if, on this vexed question, a writer should simply state his practical advice in the spirit of our friend who said, "I'm not arguin' with yer, I'm a-tellin' of yer." This method may or may not do to-day for the theologian; it used to do very well for the physican, but the time for it is past, or should be. If the facts of experiment and observation are submitted to the reader, there is no necessity for the writer to draw the inferences as to practice therefrom. The reader's logical faculty is perfectly competent for that purpose. If this plan involves much space, whereas a series of precepts—do this, and don't do that—would not occupy a page, it cannot be helped. All the essential rules for health could almost be stated in a couple of pages of this book, and the only excuse for making a book at all is to be found in the hope that the writer may demonstrate the rules to be framed by Nature herself, and may sometimes content himself with omitting them altogether and citing the facts from which they may be inferred.

Some four years ago I published an essay¹ entitled "The Verdict of Science upon Alcohol," and, on re-reading it, with something like amazement one realises how rapidly the chief problems of alcohol are in process of solution. That essay endeavoured to present perhaps an inadequate, but at least an unbiassed and moderate, account of the case against alcohol as then formulated by the scientific prosecution—or, rather, by the counsel for physiology only. To-day the *cons* there stated still stand; but the points on which the verdict of science went in favour of alcohol, *only four years ago*, must now be revised. Truth cannot be sacrificed even to the desire to seem fair, and so, in presenting in its latest form the verdict of science upon alcohol, one must risk the charge of prejudice and prefer it to the risk of treachery to truth. And, for its interest and novelty, let us consider, perhaps in irregular order, the newest, the most dramatic, and certainly the least expected and most revolutionary, of the counts upon which science bases its all but unqualified verdict of *guilty* against that chemical substance which, of all the millions known to chemistry, stands alone for sinister importance.

As a preliminary we may remind ourselves that the blood, commonly thought of as a fluid, is crammed with a multitude of living cells, which are distinguished as red and white. In a volume of blood equal to two pins' heads, there should be found some five millions of the red and some eight thousand of the white cells. These last are commonly known as leucocytes—which is, of course, simply the Greek for their English name. They exist in various forms, which probably represent different stages in the cycle of their lives. Despite their abundance—which we

¹ In "The Cycle of Life" (Harper & Bros., 1904).

would regard as amazing were it not that they are so completely outnumbered by the red cells—their business in the blood has not been easy to elucidate: yet some business they certainly must have. In their adult and most characteristic form they are described as “amœboid,” since they very strikingly resemble the *amœba*, a humble single-celled animal of our ponds. The chief characteristic of the *amœba* is its “amœboid” movement—its habit of crawling slowly from place to place by thrusting forth temporary protrusions of its substance, which are called *pseudopodia*, or false feet. If a delectable particle be encountered *en route*, two such false feet (which might equally well be described as false arms) will enclose it in the false mouth which appears between them. Thus they serve alike for hands, feet, and jaws. Certain substances and circumstances will attract an *amœba* or a leucocyte, whilst others will as definitely repel it. The study of the phenomena of inflammation has long acquainted us with what is known as the “emigration of the leucocytes.” It is known that in the course of the inflammation which is the (desirable) reaction of any tissue to an (undesirable) injury, the leucocytes congregate in the blood-vessels of the part and emigrate through their walls by the amœboid movement just described. The process may take half-an-hour for an individual cell, and is well worth watching through the microscope. Furthermore, it is found, in inflammations generally, that throughout the blood-vessels of the body the number of white cells is markedly increased. It may be multiplied as many as five or more times in the course of such a disease as inflammation of the lungs or pneumonia; and in general the presence of such multiplication of the leucocytes, or “leucocytosis,” is of good omen for the patient, whereas its absence is to be feared. *Given the disease*, the symptom of leucocyte-multiplication is a healthy one.

It was about a quarter of a century ago that Professor Metchnikoff, now the chief ornament of the Pasteur Institute of Paris, studying the ^{The work of} economy of a minute creature called the Metchnikoff water-flea, was led to a discovery which will give him a permanent name in the history of science. He found, in a word, that it is the business of the leucocytes to attack and dispose of the causes of inflammation within the body. Such causes may be mere mechanical particles of coal-dust, and in such cases the leucocytes will pick these up and dispose of them. Thus they are the scavengers of the blood. But they are far more. Immeasurably the most important causes of inflammation in the body are not mere particles of dirt, but, as every one knows, are themselves living cells, which Pasteur discovered and called *microbes*. The discovery of the great Russian scientist, on whom the mantle of the Frenchman has fallen, was simply this—that it is the habit, duty, and function of the white cells of the blood to seek out, eat up, digest, and utterly destroy the microbes of disease. If these be present in the blood itself the defenders need not undertake foreign service. But if the invaders have not attacked the citadel, the defenders will issue forth, pass through the walls of the blood-vessels, and do their duty far from home.

The military methods of the “phagocytes,” or “eating cells,” as Professor Metchnikoff has re-named the leucocytes, cannot be better studied than in the case of malaria. It is true that the ^{microbe}¹ of malaria is a bold foe, and invades the very blood itself, so that we cannot here study the emigration—or should one say the disembarkation?—of the white cells. But the microbe of malaria, though only single-celled, is relatively

¹ It is an animal, not a vegetable organism, and the term is usually confined to certain forms of the latter. But its derivation justifies a wider use of the word.

large and highly organised, whilst it contains a number of dark particles which are seen to be in active movement when the health and vigour of the microbe are at their highest. If, then, a drop of the blood of a malarious patient, taken at the right time of day, be placed upon the stage of the microscope and kept warm, it is an easy matter to detect within it two main types of actively-moving cells—the leucocytes and the microbes. Assuming that the patient is doing well, and especially assuming that his leucocytes have been fortified by the presence of a small quantity of quinine in his blood, we shall observe that the microbes are singled out for attack by the leucocytes. We need not take too seriously the stories of those observers, or poets, who have seen, or imagined, the temporary discomfiture of one leucocyte in such a case—the said wise white cell subsequently returning with two friends, and thus achieving success. At any rate, there is no dispute that the phagocytes slowly but certainly extend their deadly arms around the invaders. At last, a microbe may be seen completely enclosed within a leucocyte—which is not so very much larger than it. The rapid vibratory dance of the dark particles in the microbe gradually becomes slow and feeble. Finally, it ceases altogether. The microbe, we may take it, is dead. If we watch it yet further we find that its form can no longer be recognised. It is undergoing digestion, and shortly its sole remaining traces consist of a few scattered black dots, lying in the substances of the victor, and not yet disposed of. Meanwhile, our friend the patient is beginning to see the world again through the normally rose-tinted glasses of returning health.

In consequence of these and a thousand facts more Professor Metchnikoff long ago maintained, and still maintains in a somewhat modified form, the doctrine that, in general, our susceptibility to or immunity from disease, the process of infection, and the process of

recovery from infection—all depend ultimately upon the powers of our white cells. This is not the place in which to prosecute a controversy of long standing, but we may say that after all these years Metchnikoff's teaching stands. The white cells may or may not receive assistance from outside. Such substances as the antitoxin of diphtheria, which we owe to Metchnikoff's great German rival, Von Behring, may or may not be actually formed, as Metchnikoff teaches, by the white cells themselves. But in every case the power of the white cells, whether aided by ammunition which they themselves produce or by ammunition which other portions of the body contribute to their aid, is the power upon which largely depends human health, and upon the failure of which depends the overwhelming proportion of disease and death. This being asserted, let us return to alcohol.

In the essay referred to, I spoke—as I had been taught—very favourably of the value of alcohol in fever. Thus if we take the instance of the most deadly of all acute diseases, which is pneumonia or inflammation of the lungs, we find that, though the abuse of alcohol is notoriously one of the most important factors in its causation, the large majority of doctors habitually employ this drug in the treatment of the disease. There has never been anything like scientific proof that the administration of the alcohol is of value, but there has been a wholly uncritical and unexamined presumption in its favour, though I confess that my faith was shaken, even as a student, by the splendid records, in respect of pneumonia, of a particular ward in the Royal Infirmary of Edinburgh, the authorities of which, unlike their neighbours, did not use whisky in its treatment. But there are precise means nowadays by which the relations of alcohol to infectious disease—that is to say, microbic disease—can be fairly tested. Such tests have

been made under the guidance of Professor Metchnikoff himself, whom every one knows to be a single-eyed servant of truth, and who has no bias save in her favour. It is a privilege to give further publicity to the following sentences, quoted from the memorable lecture delivered by Professor Metchnikoff in May 1906 for the Royal Institute of Public Health in London, and before an audience worthy even of him:—

“Although the phagocytes¹ belong to the most resistant elements of our body, yet it is not safe to count on their insensibility towards poisons. We have seen how they are harmed even by small doses of opium. I am not able to enter into details with regard to all the substances which are adverse to phagocytic action, but I must call your attention to the influence of alcohol on immunity.

“It is well known that persons who indulge too freely in alcohol show far less resistance to infectious diseases, especially to croupous pneumonia, than abstemious individuals. The vaccinations against hydrophobia carried out on persons bitten by mad animals are almost always successful; but those cases in which the treatment does not stop the outbreak of the disease are most frequently observed in individuals addicted to alcoholism.

“In pursuance of this observation, Delearde, of the Pasteur Institute in Lille, has undertaken a series of experiments, which have proved to him that the absorption of alcohol is without doubt a grave obstacle to immunization against hydrophobia. At the same time he found that rabbits to which he administered alcohol in the course of immunization against anthrax died of this disease whilst the ‘control’ animals, which were given no alcohol could be vaccinated without any difficulty.

“Abbot has confirmed these experiments by proving that animals, if subjected to the influence of alcohol, became more sensitive to the harmful effects of several microbes such as streptococci, staphylococci, and bacterium coli. Later on Laitinen carried out a great number of experi-

¹ Phagocytes=eating cells—Professor Metchnikoff’s name for the leucocytes.

ments from the same point of view and with similar results. Our interest centres mainly in his experiments on vaccination against anthrax. To a number of rabbits alcohol was administered for several days in succession, and they were then injected subcutaneously with a small dose of the first vaccine of anthrax. Six animals thus treated died after a more or less prolonged illness; all of these contained anthrax bacilli in their blood and organs. Of four control rabbits which received the same dose of the same vaccine, but to which no alcohol was administered, only one died, whilst the other three enjoyed perfect health. Several other experiments furnished similar results.

"Alcohol therefore suppresses the natural immunity of rabbits towards the first vaccine of anthrax. This impairment of their resistance was manifested by the inactivity of their white blood-cells; thus the bacilli were permitted to multiply without being checked by a sufficiently strong phagocytic reaction. As has been established by Massart and Bordet, the leucocytes are sensitive even to small doses of ethylic alcohol, and present a negative sensibility in the presence of this substance.

"Besides its deleterious influence on the nervous system and other important parts of our body, alcohol therefore has a harmful action on the phagocytes, the agents of natural defence against infective microbes. . . .

"As a logical consequence of the experiments on the weakening of immunity under the influence of alcohol, it has been suggested to eschew this substance in the treatment of infectious diseases . . . we must strongly insist on the danger of alcoholism with regard to resistance against pathogenic microbes."

The reader will see that the question now under discussion has been answered by cold science, which is concerned, as such, merely to ascertain and register *facts*. Surely the facts quoted, in the exact words of the authorised translation from the original French of the lecturer, are worthy of the widest dissemination throughout the world.

These experiments—and now the bedside observa-

tions of many and ever more physicians—compel me therefore, to eat my words. In favour of alcohol one can no longer state, as I am sorry to say that I used repeatedly to state, that it retains its claim to utility in fever. The drug, in a word, paralyses the defending army, and the serious question arises whether any advantages it may possess are not more than outweighed by this gravest of disadvantages. It may be predicted that in ten years alcohol will be no longer administered in fever, for bedside observation is now being found to coincide with the indications of experiment upon the blood of the lower animals. Out of the mouths of two such witnesses the evidence that proceeds must be held valid.

Much space has purposely been spent upon the discussion of these entirely new and revolutionary observations. Now, as briefly as possible, let us sum up the main counts on which previously, science had condemned alcohol. Science has proved that the paradoxical substance which makes us feel warm, and which we therefore take “to keep out the cold”—a quite insane proceeding—markedly and constantly lowers the temperature of the body. It does this in fever. But we shall see that to give drugs which lower the temperature in fever is to interfere with one of the conditions which the body provides for its own defence. Alcohol lowers the temperature because it throws much warm blood to the skin, the temperature of which, with characteristic superficiality of judgment, we regard as *our* temperature. Not only does it increase the loss of heat from the body, but it also lessens the production of heat—*i.e.* the production of energy—within the body by its action upon the red blood cells, an action much longer known than that upon the white cells. Alcohol increases the stability of the compound which the remainder of the red cells forms with oxygen, so that

the rate at which the oxygen is given up for the burning or combustion of the tissues, with consequent production of heat, is much reduced. Alcohol contains no nitrogen, and is therefore incapable of replacing tissue-waste within the body. Yet—paradoxically again—it often leads to the accumulation of fat, because it prevents the fat from being burnt up. Yet again, the drug which most of us think of as a *stimulant* may possibly still claim some place of esteem for the physician, since it may be of value as a *sedative*—another paradox. The stimulation of the heart by alcohol, being very rapid, is invaluable in many a fainting-fit; but alcohol is a deceiver ever, as we have seen, and its stimulation, unlike that of a true heart stimulant such as coffee, or a truer heart stimulant such as foxglove or digitalis, is followed by a greater depression. It is therefore properly classed as a *pseudo-stimulant*, the action being due to its paralysis of the nerves which normally restrain the action of the heart.

But the paradoxes are not yet ended. There seems to be no point on which alcohol does not claim from the uncritical a verdict which the man of science finds it necessary to reverse. We might well have spent a whole chapter upon the work of Kraepelin concerning the effect of alcohol on the brain and mental action. Most of us believe that we think more quickly, more brilliantly, more effectively, under the influence of alcohol. For certain temperaments this may possibly be true. We know that Coleridge wrote his "Kubla Khan" under the influence of opium, and this teaches us a general lesson as to the possibilities involved in the first or pseudo-excitant stage of the action of narcotic drugs upon brains of certain types. But Kraepelin has proved in his psychological laboratory that the mental action of the normal brain is hampered by alcohol. The owner of the brain does not agree. Tested with a column of figures, with a simple matter of logic,

with the formation of a simple association of ideas, or with tests of quickness of response, the normal subject under the influence of alcohol thinks that he is doing splendidly. On the contrary, he is doing very badly indeed. Though he seems to himself to be working at great speed, the tell-tale pendulum or tuning-fork finds that he is working more slowly than normally, and the examination of his results shows that they are less accurate. The scientific study of alcohol is a study of paradoxes, of which this last is the most striking.

A still more recent instance of the point in question may be quoted from Mr. M'Adam Eccles (*British Journal of Inebriety*, April 1908):—

“The want of efficiency produced by alcohol is well shown by a series of experiments arranged in Sweden, with the object of ascertaining the influence of alcohol upon accuracy in marksmanship. None of the men experimented upon were abstainers. Three corporals and three privates were chosen for the purpose. In the first series of experiments no alcohol was given. In the next it was provided, and in the third it was again withdrawn. Spirits and beer were alternately tried. The result of these experiments indicated, without a single exception, a reduction of the accuracy of aim as a result of the alcohol consumed. Yet all the men, after receiving their allotted portion of alcoholic drink, had declared that they felt far more capable—but found themselves deceived.”

One should call special attention to this matter because the facts, as scientifically ascertained, are so strikingly at variance with popular opinion; and let us first insist upon the validity of our authorities. It need hardly be said in passing that their results have been abundantly and repeatedly verified by subsequent observers—as is the case with Professor Metchnikoff's researches upon the action of alcohol on the white cells of the blood. One is concerned

here only to present indisputable facts; the case is far too strong to excuse a writer for making dubious assertions. If I were to do so, there might well be applied the famous words of Sir Thomas Browne, "Every man is not a proper champion for truth, nor fit to take up the gauntlet in the cause of verity." Professor Kraepelin's name is doubtless unfamiliar to the general public, but few who know would dispute the proposition that he is at this moment the greatest living student of the mind diseased.¹ In his own great sphere he is as illustrious a figure as Professor Metchnikoff is in his. We must accept no authority as such on any point, and, for the matter of that, Professor Kraepelin's work can be repeated and verified with the simplest apparatus in any psychological laboratory anywhere; but the reader should recognise that the names quoted are held in reverence by all who know for what they stand. The opinion of the practitioner who has read nothing for thirty years does not count against these.

Before we go on to consider what is, perhaps, the most interesting discovery regarding the action of alcohol upon the brain—for which its affinity is Alcohol and so remarkable that in cases where, after motoring death, the most delicate chemical tests fail to reveal the presence of the minutest trace of alcohol in any other organ or tissue, it can be readily detected in the fluid peculiar to the brain and spinal cord—let us adduce from a very different field a striking confirmation of the scientific work of Kraepelin and his followers. Every one who can afford it runs a motor-car nowadays, and motorists as a whole can scarcely be described as possessing any particular prejudices against alcohol, nor as being peculiarly distinguished by psychological knowledge. They are merely a common-sense, prac-

¹ He approached the question many years ago as a believer in the virtues of alcohol.

tical body of men who indulge in a sport that is not without risks, and who have their necks to think of; not one in ten thousand of them has ever heard of Kraepelin. But what is the first essential demanded by every prudent motorist when he is selecting a chauffeur? It is that he must be a total abstainer. Practical hard-headed experience has shown that the nervous balance required in a man who drives a motor-car is impossible of maintenance under the influence of alcohol. Thus almost the first thing that a chauffeur puts down, when he is writing an advertisement for a post, is that he is a total abstainer. There is no fanaticism or sentiment about this, but there is sound science—for science is none other than organised knowledge or organised common-sense. Your man may sometimes be late, may sometimes forget to clean his brass, or may even be inclined to take unnecessary risks; but, at least, he shall have no alcohol in his brain when he is driving your wife and child. I personally have a curious idiosyncrasy towards alcohol, so that, though I do not taste it once in a twelvemonth, I have, on a few occasions, been able to take extraordinary quantities for the purpose of observing its effects, and have never been able to observe any effects of any kind, either upon mind or body; yet I should never dare to drive a motor-car after taking even a single glass of whisky.

Now it is a notorious fact that, notwithstanding all that has been said, an apparently stimulating effect of Alcohol and alcohol upon the brain is constantly observed self-control served at every dinner-party. When the company assemble and make each other's acquaintance, they are comparatively silent and reserved, not to say dull, but when the champagne begins to circulate they reveal to each other hitherto unsuspected powers of conversation and humour; whilst after dinner, in the smoking-room, the men find it as easy to talk as it is difficult to get a hearing. Has not the alcohol in such

a case plainly stimulated the intellectual and lingual powers? The answer is that here is *another* paradox. The nervous system of man, as Dr. Hughlings Jackson long ago pointed out, may be conceived as consisting of a number of *levels*, each of which exercises a power of control or inhibition upon the levels beneath it. The lowest level, which is also the oldest in the history of the race, is the most stable; whereas the highest is the most delicate and unstable, being also the latest of evolution in the history of life. A paralytic agent, such as alcohol (the same being true of many others, and also being true of the onset of sleep), attacks each level successively, from above downwards. Now what is the function of the highest level of all? It is inhibition or control, judgment and self-restraint. When you enter the reception-room before dinner and encounter a number of strangers, you are on your best behaviour; you are not going to make a fool of yourself or "give yourself away" before people of whom you cannot be sure. Whatever stores of intelligence and humour you may have are by no means left at home, but the highest level of your brain is doing its work, and you have yourself well in hand. Then comes the champagne, and the first part of your nervous system which it paralyses is the highest and least stable. Its action is arrested, caution and restraint, and not infrequently even common prudence, are cast to the winds, and you let yourself go. To interpret this as the stimulation of thought and speech is pure ignorance: the results are the results of paralysis of the inhibitory or self-controlling centres. Let the taking of the drug be indefinitely continued, and speech, formerly fluent, will become incoherent; thereafter even the oldest centres will be attacked, until at last the "vital point," or the centre for respiration in the lowest part of the brain, is paralysed, and the patient dies of acute alcoholic asphyxia.

The foregoing statements about alcohol may tell this way or that way; they may be new or old, pertinent or impertinent; they are submitted to the thoughtful reader as *true*. These statements, excepting those concerning the white cells and the relation of alcohol to fever, have been made repeatedly in many places during the last four years, and frequently not without some truculence of tone and an evident yearning to fight. But though I have trailed the tail of my coat so long, no one, either in England or America, has yet trod upon it. I think, therefore, we may be assured that *there is no case for the defence*.

We have here confined ourselves to the briefest possible statement of the verdict of physiological and psycho-physiological science only. But the reader will admit that there is a fairly comprehensive range even within these limits, since they enable us to speak, at the one extreme, of the crawling movement of white blood cells, and at the other of the supreme human character of self-control. But chapters at least equally formidable might be severally written upon the verdicts of a host of other sciences. There is, for instance, the verdict of psychiatry or the science of insanity. If we say that alcohol is responsible, directly or indirectly, for anything between one-third and one-half of all cases of insanity, we are well within the mark, and are only indicating the sum and substance of a terrible indictment that might be written. Another such indictment might consist of the verdict of pathology—the science of disease—changes within the organs and tissues of the human body. There is no organ or tissue, not even excepting the skin, that does not display alcoholic changes only too familiar to the pathologist. His verdict, one need hardly say, is echoed by that of clinical medicine (Greek *kline*, a bed), the study of disease by the bedside of the living patient.

More significant still is the fact that if even a volume were occupied in recounting the verdict upon alcohol of the various studies which may be grouped together as the biological and medical sciences, there would yet remain a whole group of sciences, subtler still, with which the friends of alcohol must reckon. These are the *social sciences*, the truly scientific character of which thinking people are just beginning to recognise. One of the newest and most interesting, though perhaps the smallest of these, is criminology, the science of crime. How wretched and imbecile an unguided society may be in such matters is sufficiently proved by such cases as that of Jane Cakebread, who was convicted for drunkenness on hundreds of successive occasions in London, to the accompaniment of the laughter which King Solomon well described as "like the crackling of thorns under a pot"—the laughter of fools. But it is not with the mere crime of drunkenness that we need be most concerned: it is with alcohol as a cause of crime of more serious kinds. It might easily be shown, if this were the time and place, that the science of criminology alone returns a damning verdict against alcohol. Or, again, take another small department of the social sciences—the science of vital statistics, the chances of life, and the rates of insurance. There is surely no particular fanaticism or sentiment about insurance offices, any more than amongst motorists; they are now learning to discriminate between those who drink and those who do not, *because it pays*. Doubtless there are sources of fallacy in these statistics, but it may easily be proved that, when these are eliminated, alcohol, as a factor in the matter of vital expectation, is one of the foremost subjects that can concern the practical sociologist.

Lastly, there remains the verdict and the monstrous practical problem, still unsolved, of the great science called jurisprudence; what has legislation done, and

what can legislation do? For it must be remembered that, though science in these days of free thinking can arraign this suspect, like any other, before her bar, asking no one's leave, can find it guilty, and can even pronounce sentence, *society alone can carry the sentence out.*

It is pre-eminently in legislation that some believe for the effecting of this purpose, and we can certainly lend no countenance to the belief, which is surely idiotic, that no kind of legislation whatever can effect anything in this direction; but, perhaps because I am inclined to magnify my office, I place my trust in education rather than compulsion—in the reformation of that public opinion which Huxley was only too right in calling a “chaos of prejudices,” but which alone rules the world. In the words of Hosea, the “people are destroyed for lack of knowledge,” and it is the duty of those who possess the knowledge to disseminate it, that the people may live: which end may these pages serve.

Let us turn now to consider the claims of alcohol to rank as a food. The working-class family spends, on an average, six shillings a week upon it; and we are about to provide non-contributory old-age pensions in Great Britain. The question has its political as well as its personal side.

Unlike other substances, alcohol requires independent consideration both as a food or beverage and as a drug, for it might be both. In this scientific age it would be wrong to appraise it as a food a drug—that is to say, to consider its actions in disease—without acquainting ourselves with its properties in health, its actions upon the normal body. This is only to say that, as in the case of all other drugs at the present day, a rational therapeutics or application in disease must be preceded by a critical pharmacology, which is the science that concerns itself

with the action of drugs upon the normal body. But the pharmacology of alcohol—to use the technical phrase—is of more interest than that of any other drug. For this substance claims to be regarded as a food, and the study of its history in the healthy body is therefore an end in itself, quite apart from any question of its applications in disease.

Plainly, alcohol can never be a food alone. A typical food, such as white of egg or sugar, passes into the body, is digested and utilised. It has no appreciable actions upon the body except the production of the reactions necessary for its digestion. It does not affect the rate of the pulse nor the process of respiration. It is simply a food material and nothing more. Alcohol, however, though it may be taken merely as a food or beverage, and though it may conceivably possess food properties, is never neutral as regards the functions of the body. *Alcohol the food must always be alcohol the drug as well*—a point all but invariably forgotten by its friends.

Its claims to be regarded as a food can readily be examined. Every food substance must either supply a necessary ingredient of the bodily composition or it must be a source of energy. Common salt is a food because sodium chloride, of which it consists, is a necessary ingredient of the body. It is constantly being lost from the body, and must therefore be constantly supplied to it. On this score, at any rate, alcohol has no claims to be regarded as a food. It may occur in the abstainer's body, but only as an effete product. Again, white of egg is a food because it is a proteid capable of replacing the body proteids, which are constantly being broken down and destroyed in the course of the vital processes. Our life depends upon the incessant destruction of our tissues, and anything is a food which will make new tissue. Alcohol is not a constituent of any tissue, and is incapable, as its chemical composition

admittedly proves, of being utilised even as a mere brick in the building up of any tissue. It contains no nitrogen. It has no claims, therefore, to rank amongst the most valuable and essential kinds of food material.

Now such a food substance as white of egg is not merely capable of replacing tissue, but can also supply energy to the body. It is thus, in a special sense, a complete food material. But there admittedly do exist a whole host of food materials which, though they are incapable of forming tissue, are at least indisputable fuel for the body furnace. Typical of these is that invaluable fuel *sugar*, which is stated to be the source of about half the total energy of the body, including the energy displayed in the form of heat and the energy displayed in the form of muscular motion. Food materials of this subsidiary but not unimportant order all agree in one essential character: they are capable of being burnt at the temperature and under the conditions of the human body. It is in virtue of this burning, combustion, or oxidation that they yield heat and other forms of energy whereby we live. Now sugar, for instance, will not burn at the temperature of the body *outside the body*. Very much higher temperatures are necessary before it will combine with the oxygen of the air. But when the sugar is taken into the body and meets with oxygen of the air which has been taken in for the purpose by the lungs, it is capable of being burnt, the difference being due to the presence of substances called ferments within the body. Now the question is whether alcohol is entitled to rank in the same class as sugar.

When we study the chemical composition of alcohol we discover facts which do not discountenance this supposition. For the chemist, the substance which we usually call alcohol is the second member of a large

series of alcohols, and its special name is ethyl alcohol. Every molecule or smallest possible portion of this substance contains two atoms of carbon, six of hydrogen, and one of oxygen. Now carbon and hydrogen are highly combustible or oxidisable substances, and they need far more than one atom of oxygen in each molecule of alcohol to satisfy their affinities for it. Fully to burn up all the carbon and hydrogen in one molecule of alcohol would require not one atom of oxygen, but seven. The theory of the chemist is of course verified by common experience, as every one who has burnt methylated spirits can testify. Alcohol is combustible outside the body at a sufficiently high temperature—that is to say, if a lighted match be applied. The first question for us is whether the conditions of the human body are such that, even at its modest temperature of only 98.6° F., it is capable of oxidising alcohol. This can positively be answered by experiment. Let alcohol in various strengths and in various beverages be administered to the subjects of our experiment, and then let us ascertain whether all that was given can afterwards be recovered from the various channels, such as the skin, the kidneys, and the lungs,¹ by which the body gets rid of foreign substances. Alcohol is a foreign substance essentially, whether it be a food or not, for it is never allowed long to remain in the body as such.

Now the result of these experiments is to prove that not all the alcohol given can be recovered; some of it has vanished, and it has vanished because it has been oxidised in the body. The reader will observe, of course, that we are not now discussing the question of the food value of such a beverage as beer; we are merely discussing the value of the alcohol in the beer. The relative value of the various beverages, depend-

¹ And, *very notably*, the breasts in the case of a nursing mother.

ent upon their possession of other substances than alcohol, is a matter for separate consideration.

But as every one who has encountered the breath of a drinker knows, not all the alcohol consumed is burnt up, and we must therefore inquire into the limits within which alcohol is combustible. For instance, if ten glasses of whisky be consumed in a day, how much of the alcohol they contain is burnt up, and how much leaves the body as such? This highly important question has been very critically examined, and with fairly definite results. The amount of alcohol which can be burnt up in the human body is exceedingly small, even under the most favourable conditions. If it be taken in small quantities at a time, and well diluted, probably about one and a half ounces of alcohol can be consumed, oxidised, and destroyed in the normal body in twenty-four hours. The conditions necessary for the combustion of this very small amount are never complied with by those who use alcohol as a beverage. If they *were* complied with, and if the combustion really involved the production of food-value, this would be practically negligible, whilst its cost would compare very unfavourably with that of any other food substance in common use.

In short, the claims of alcohol to be regarded as a food in health are of the flimsiest and most trivial description, even without further examination. Under conditions never complied with, a perfectly trivial amount of alcohol, costing a ridiculously large sum, may be oxidised in the body; no more can be said.

But, indeed, more can be said. For the argument that, if alcohol can be consumed in the body it is Alcohol is therefore a food, is fallacious, as has lately not a food been pointed out. Morphine, for instance, and many other poisons, are oxidised or burnt in the body, but no one could therefore call them foods. Their combustion is one of the means by which the

body protects itself. The same is true of alcohol, and its combustion and consequent destruction is the means by which, together with extremely rapid excretion of the remainder, the body protects itself as far as possible from its poisonous action.

The point in question is a very good instance of the risks which attend the writer who ventures to say any good of alcohol. (There are risks of another order in saying evil of it, however truly, but that is another matter.) The necessity of retracting, after only a few years, various statements made in favour of alcohol—and its remaining professional supporters are mainly elderly gentlemen who prefer the doctrine, opposed to all the spirit of science, “What I have said, I have said”—should have warned me. Yet, in the first draft of this chapter, the oxidation of a small quantity of alcohol under certain conditions was accepted as evidence of its food-value; and now, on revision a few months later, one has to alter and add in the light of more recent observations, which teach that if alcohol is to be thus regarded as a food, so must every other oxidisable poison, from morphine downwards, against which the body thus protects itself. If any good apparently remains to be said of alcohol to-day, one must beware lest to-morrow gives one the lie!

But we have hitherto dealt with only one side of the question. Alcohol the food is also alcohol the drug, and we must balance the two sides. Alcohol as a drug in health of the account before we can return any final answer to the question of the “use” of alcohol in health. In the case of a true food there is no need to ask the question, “What else does it do?” But that is precisely the question which we must ask in the case of alcohol. A great authority, Professor Sims Woodhead, has well said that, at a pinch, you may run a marine engine with sea-water and find harbour,

but you will ruin your engine in the process; and the fact is that alcohol—even were it a food—would necessarily be like sea-water in this respect. It would help to run the engine, but it would shorten its life. This we shall see when we proceed to consider what is technically known as the pharmacology of alcohol—its action upon the healthy body.

As we have already hinted, the characteristic and most important actions of alcohol are upon the nervous system, both in its capacity as the organ of mind and as the governor of the physical processes of the body. But we may leave these at present and begin at the beginning—the local or contact actions of alcohol upon the tissues which it encounters on its way to the nervous system. In a word, alcohol is a local irritant, its exercise of this property depending, as in the case of all irritants, upon its concentration. The initial effect of any irritant is to cause increased activity and the presence of an increase of blood in the tissues with which it comes in contact.

Dismissing as unimportant the effects of alcohol upon the mouth, we may consider its action upon the stomach. It has very long been believed that the drug aids digestion, and there can be no question that there are alcoholic beverages which have this effect; but it is more than questionable whether the virtues of beer, for instance, in this respect should not be attributed to ingredients other than its alcohol. In the first place, the proportion of alcohol in beer is very small, yet beer may promote digestion whilst whisky cannot, though its proportion of alcohol is large. Again, non-alcoholic beers are much more valuable for the digestion than ordinary beers, their virtues being due to the bitter substances, and more especially to the digestive ferments, which they contain. It is thus a mere failure of discrimination to attribute these virtues to beer as an alcoholic liquor. The typical actions of alcohol upon

the stomach are those of an irritant, and, if this irritation be persistently exercised, the result is to produce permanent changes in the structure and functions of the lining of the stomach. In thousands and thousands of cases these changes, which are absolutely irreparable, proceed so far as to cause permanent dyspepsia, with dilatation of the stomach, and a host of subsequent evils. Passing onwards from the stomach, alcohol in a highly concentrated form tends to interfere with the movements of the digestive canal. In certain cases it may be usefully administered for this purpose; but, when these movements have not been rendered excessive by other causes, the action of spirits will evidently be in the direction of aggravating one of the commonest minor maladies of civilised life.

Alcohol is then absorbed into the blood, and proceeds to exercise its powers upon that invaluable fluid, and upon the various organs and tissues it nourishes; but if the dose was fairly concentrated, certain of these organs have already been affected, not by the presence of alcohol within them, but by what is called reflex stimulation from the stomach. The organ most markedly thus affected is the heart, the movements of which are accelerated. Together with this acceleration there goes a tendency to relaxation of the blood-vessels, so that the circulation is hastened. In cases of threatened heart failure from shock—as when a person faints on hearing bad news—or in cases of fainting from any cause, this instantaneous reflex action of alcohol, which anticipates even its very rapid absorption into the blood, may be of the utmost value, as we all know.

But here we must interpolate a warning. All cases of apparent fainting are not true faints, and it is only in cases of the true faint that this action of alcohol is desirable. On two occasions fainting it has been my experience to interfere, not without difficulty, with the administration of alcohol to a patient

stricken with apoplexy in a concert room. To the un-instructed eye such cases resemble those of fainting and spirits are only too frequently given. Apoplexy is due to the escape of blood from a broken vessel in the brain, and it will be evident to the reader who has followed me thus far that the administration of alcohol to such a patient is precisely the worst measure that can be adopted, since it instantly provides all the conditions necessary for acceleration of the hæmorrhage which is threatening to take the patient's life. There are many other cases of loss of consciousness due to various kinds of auto-intoxication, as the phrase goes—that is to say, intoxication by the body's own products—and even cases of acute intoxication by alcohol itself, besides those due to various other poisons, such as oxalic acid and carbolic acid—in which the common practice of the helper is to administer a dose of spirits. Practically without a single exception these cases are injured by such a procedure. It is only in the simple faint that alcohol is really useful, and scores of lives are lost every year by its stupid administration in cases where it can only injure.

Now, having noted the remote effects which alcohol can produce, even before it enters the blood, let us note its effects upon that fluid itself. In the first place, as Professor Metchnikoff has lately proved, it tends to paralyse the movements of the white blood cells. This, as we have seen, is a matter of the first importance in disease. In the case of the healthy body, which we are now considering, this alcoholic paralysis of the white cell—the guardians of the body—is a matter of importance not graver than that of the drunkenness of an soldier in time of peace. It probably makes him less fit for the fray when the occasion arises, but it is of little importance for the moment. Fortunately the white cells are seldom actually at war: the successful

Remoter
effects of
alcohol

entry of microbes into the body, as distinguished from their mere entry into the nose or stomach, is not a matter of everyday occurrence.

More important from the point of view of the man in ordinary health is the influence of alcohol—already briefly alluded to—upon the red cells of the blood. The substance which gives these cells their colour is known as hæmoglobin—the most complex chemical compound with which we are acquainted. Its business is to form a loose compound with the oxygen which it encounters during its passage through the lungs, and in its subsequent journeyings to give up this oxygen wherever it is needed—that is to say everywhere, for every living molecule or cell lives in virtue of combination with oxygen. Certain agents are capable of making this loose and temporary compound, “oxy-hæmoglobin,” somewhat firmer and more permanent, with the consequence that, though the oxygen is obtained readily enough from the lungs, it is not readily handed on to the tissues. Alcohol has been definitely proved to possess this property. Now there are two conspicuous results of the oxidation of the tissues. The oxidised tissue breaks down, is burnt up and disappears: and in the process heat is produced. Hence we find that the habitual consumption of considerable quantities of alcohol, interfering with this process of oxidation, leads to the accumulation of superfluous tissue in the body—in a word, the drinker becomes stout. Certain alcoholic beverages, such as beer, contain food material which, if properly burnt up, would provide the body with heat and energy, but the alcohol which is taken with them interferes with their combustion, and consequently they accumulate. The hideous obesity of many drinkers is familiar enough.

But the diminished production of heat may also be a matter of importance. We know definitely that the maintenance of the normal temperature of the body

enables it to resist the attacks of microbes. A hen is commonly immune to anthrax, but if its body temperature be reduced by standing its feet in cold water, the injection of the same dose of bacilli as was formerly inoperative will cause a fatal attack of the disease. We know also that when microbes have taken their hold upon the body it commonly raises its own temperature—with the production of what we call fever—for the purpose of aiding it in its resistance. Physicians of the past generation regarded fever as dangerous in itself, and opposed it by various means—including, when they were introduced, such dangerous drugs as antifebrin and antipyrin, which lower the fever, but do not in the least degree affect its cause. It has now been proved, however, that such procedure injures the patient. Furthermore, it has been proved by the closest experiment that the various degenerative changes in the body which used to be ascribed to fever, and were indeed ascribed to fever even when I was a student, are not at all the products of the raised temperature of the body, but are the results of its poisoning by microbes. If the poisoning be present, but the temperature kept down, these disastrous changes still occur. If the temperature be artificially raised without any poison, and be even maintained at what used to be thought a dangerously high level, for long periods of time, these degenerations do not occur. In the last ten years a wiser medical science has completely revolutionised the old conceptions of fever. Now let us apply these facts to the case in point.

It follows that any substance which tends to interfere with the normal production of the bodily heat tends *ipso facto* to lessen its powers of resistance to microbes. Thus we find that the action of alcohol upon the red cells of the blood has—in effect—the same result as its action upon the white cells of the blood, already noted. Not only does it directly paralyse the

defenders, but it interferes with the conditions under which alone, even if they be not paralysed, they can best do their work.

Yet, again, to complete our consideration of this subject, alcohol notoriously dilates the superficial blood-vessels of the body. It throws a large amount of blood to the surface of the body, which is in contact with the cool external world, and thus it very markedly increases the loss of heat from the body. It thus strikes at the maintenance of the bodily temperature in two complementary ways—both by interference with the production of heat and by acceleration of the loss of heat.

Observe, then, the supreme fatuity of taking a nip of whisky on leaving your friend's house on a cold night in order to "keep out the cold." It is your experience that such a dose of alcohol makes you feel warm. You know that it is good to be warm, so far as the attacks of the microbes of a common cold or bronchitis or pneumonia are concerned; and you think that if you feel warm you *are* warm; but your judgments are superficial, as are all our judgments that are based on mere sensation without reflection. When you say you are warm, all you mean is that your skin is warm. The nerves of temperature are not supplied to the interior of the body, but to the skin alone, and it is its temperature alone that they register. If the terminals of these nerves be bathed in a large quantity of rapidly-flowing blood, as is the case when alcohol has been taken, you feel warm, and think that you are warm. But in point of fact you are, of course, losing your heat with very great rapidity. This is evident to common sense; it can be proved by experiment in health, and it is notoriously true of disease, for the substance which is taken by the layman in order to keep out the cold is, or used to be, given by the doctor in order to lower the temperature in fever—which it most effectively does.

We now have a complete explanation of the fact that the absorption of alcohol, with subsequent exposure to cold, so frequently results in pneumonia, which is by far the most fatal of all acute diseases. The microbe of pneumonia is quite commonly found in the mouths of healthy persons, waiting for a breach in the defences. Their host marches out into the night, fortified by a dose of whisky in order to keep out the cold. His idea of keeping out the cold is to give out as much heat as possible to the cold, and to interfere, as far as may be, with the production of any more heat: and in order to do the thing thoroughly, he arranges for the paralysis of his leucocytes. What more can the most dainty *pneumococcus* demand?

The reader may or may not continue to take alcohol after reading this chapter, but if he *does* continue, at least let him be honest with himself and admit that he takes it because he likes it—which is no bad reason in itself. But at least let him refrain from taking it in order to “keep out the cold.” If he does so, he is not merely ignorant, as we all are, but I will frankly declare that he is incapable of being taught. Now if the survival of the fittest means anything in modern society, it is that the capacity for learning, whether by personal experience or by the experience of others, is a factor that has survival-value, and the reader who will not learn or cannot learn will assuredly tend to go under—he and his children: and the sober question must be asked whether, on the whole, his disappearance, doubtless to be regretted on personal grounds, is not for the benefit of the race at large.

We have come to observe that alcohol tends in two ways to lower the bodily temperature in health and also in fever, and only ten years ago it would have appeared that this tendency to lower the temperature must be counted to it for a virtue which may be balanced against its vicious action upon the white cells.

But our new knowledge of the meaning of fever has made it a laughing-stock. Fever is not a disease, but a symptom. It is not bad in itself, but good. It is a bad thing that fever should be necessary for the protection of the body; but, if it is necessary, it is a good thing that it should be available. To interfere with fever, whilst doing nothing to interfere with the activity of the microbes which have evoked it, is more akin to murder than to medicine. In future, then, we must divide all febrifuge or antipyretic measures and drugs into two classes. In the one class, the members of which are lamentably few, is quinine as administered in malaria; this is a febrifuge because it kills the microbes that make the fever necessary, and with their death it declines. *O si sic omnes!* In the other class, the name of which is legion, are to be ranked such drugs as alcohol and antifebrin, which do not injure in any degree the microbes of disease, but merely make the body incapable of providing the temperature which it finds necessary for its defence—besides paralysing the defenders. Only a few years ago, in my discussion of the “keep out the cold” theory of alcohol, I used to ask the public to contrast this practice of theirs with the fact that alcohol is given by doctors in order to produce cold—that is to say, in order to lower a high temperature. There was a possible retort to this. If amongst the hundreds of thousands of persons, or rather millions, who must have read these attacks, there had been one intelligent and critical publican or shareholder in a brewery company, he might have retorted that, since doctors found alcohol useful in the cure of fever, surely the public were justified in procuring it for the prevention of fever. In stating the case of science against alcohol, however, it is apparently possible to leave oneself open to such retorts, perhaps because of those effects of alcohol upon the mind which are notorious to all.

That weak point in the argument, however—or point which would be weak if it had to bear any strain—can now be strengthened, for it can no longer be maintained, as in the desire to be impartial I used to maintain, that alcohol is valuable in fever. It was supposed to be of some value as a food that requires no digestion; but, at any rate, it is of less than no value in so far as its febrifuge properties are concerned—in so far, it is objectionable just as antifebrin is objectionable, and in so far its use should be abandoned just as the use of antifebrin has been abandoned. Nowadays the doctor welcomes the decline of the fever if he believes that this indicates the disappearance of the need for the fever; but as long as the need persists—a need which alcohol does nothing to remove—he desires to see the fever well maintained, and nothing alarms him more than the failure of the body to maintain it in such circumstances. He knows that the falling line of the temperature chart may mean either the destruction of the invaders or the failure of the defences, and he will no longer be deceived into paralysing the defences by alcohol under the delusion that the decline in temperature thus caused indicates the destruction of the invaders.

In association with the subsequent chapter on the use of meat, the reader may note the following Alcohol and recent summary of the relations between meat alcohol and meat (*British Journal of Inebriety*, April 1908):—

“While, then, alcohol may act directly upon the elastic tissue of the arterial wall, this is not all, for it may also act indirectly. Alcohol retards the excretion of toxins and other poisons from the blood. It is a fact worthy of notice that muscular activity causes the formation of a peculiar waste product termed ‘hypoxanthin.’ This has to be eliminated as quickly as possible if the individual wishes to keep fit. It is absorbed by the lym-

phatics and passed into the blood, by it carried to the kidneys, and by them excreted. It is a definite poison, and, like alcohol, tends to produce arteriosclerosis [*i.e.* morbid arterial hardening]. Alcohol markedly diminishes the excretory power of the organs which cleanse the blood of its impurities. Alcohol thus prevents the rapid elimination of hypoxanthin, with the result that the blood becomes surcharged with the poison. In this fact lies the chief reason why all in strict training advisedly eschew the use of alcoholic beverages. Hence it can be clearly seen that the two deteriorating substances may be acting together, the one being, as it were, the complement of the other, with the consequence that the alteration in the arterial wall is doubled in its severity. Overeating of animal food introduces into the blood an excess of a similar product to that known as hypoxanthin, and, where this over-indulgence in meat diet is associated with an habitual use of alcohol, the double force will again be at work."

There is no lie about alcohol which the medical profession has not in its day supported; but that profession can learn, and so must the public. Prominent amongst these lies was the idea that alcohol was protective against consumption and tuberculosis in general. The most recent pronouncement of a great pathologist, Professor Sims Woodhead, may be quoted ("The Drink Problem," page 76):—

"Alcohol, far from being antagonistic to tuberculous disease, as was at one time supposed, is looked upon as one of the great predisposing factors in the production of both acute and chronic pulmonary tuberculosis, and it is generally accepted that in alcoholic patients tuberculosis is far more likely to assume an acute and generalised form than it is in the non-alcoholic patient; for, as Dr. Dickinson said, 'We may conclude, and that confidently, that alcohol promotes tubercle, not because it begets the bacilli, but because it impairs the tissues and makes them ready to yield to the attack of the parasites.' In France, in the districts in which the greatest amounts of alcohol

are consumed, the highest mortality from tuberculosis is met with, alcohol apparently acting as a devitalising agent, and rendering the person indulging in it to excess a more easy prey to infection. Baudron, in 1901, showed that the consumption of alcohol of 12.5 litres per person corresponded to a mortality from tuberculosis of 32.8 per 1,000 living, whilst the consumption of 35.4 litres of alcohol per person corresponded to a death-rate from tuberculosis of 107.8 per 1,000."

In the same volume, page 204, Dr. Ralph Crowley says:—

"Alcohol was at one time supposed to be antagonistic to the development of tuberculosis, but this idea was a 'theory' based on no careful examination of the subject. We are now daily becoming more convinced of how surely intemperance predisposes to the development of tubercle by making the tissues a more suitable soil in which the bacilli may develop and grow. In the phthisical wards of a poor-law hospital, as I know from experience, the majority of the male patients will be found to have been heavy drinkers."

But there is another aspect of this question which we have only recently learnt to recognise. Consumption is an infectious disease, and it is ill that one should prepare the soil for it; for, as a great French physician has said, "*L'alcoôlisme fait le lit de la tuberculose.*" It is also ill that one should expose oneself to the infection; but worst of all is it to do both simultaneously, and that is the normal practice in the public-house. If you are to take alcohol, at least take it in a clean atmosphere and away from infection. In the public-house you prepare the soil not only by the alcohol, but also by the breathing of impure air; also, you pre-eminently expose yourself to infection. There are people who do not feel comfortable about visiting a sanatorium for tuberculosis. Even the domestic servants in such a place are, however, found to be quite

safe. But if you care to examine the floor sweepings of the average public-house, you will frequently find active tubercle bacilli there. We are indebted to the recent work of Dr. James Niven (Medical Officer of Health for Manchester) and others in this respect. In *The British Journal of Inebriety*, April 1908, Dr. Davies (Medical Officer of Health for Woolwich) recurs to the subject. He says, "From inquiries into deaths from, and notified cases of phthisis, and from the Registrar-General's returns as to the phthisis death-rate of public-house servants, I arrived at the conclusion that the public-house, after the home, is probably the most important source of infection in this disease. Further investigations have confirmed this opinion. Men, of course, are the principal victims in this way, though many cases have been met with in which women, too, were probably infected at the drinking-tavern." The public-house is a great resort of consumptives, and therefore of active tubercle bacilli introduced by their spitting and coughing. I must refrain from discussing the disastrous effect of the public-house in the tuberculous infection of children; but the point for us is that the public-house as it exists at present is rivalled only by the tuberculous home as a centre of tuberculosis infection in general. As we have seen, all the conditions are favourable to this end. The wise reader will therefore beware. Personally, if ever I entered a public-house, I should take good care to keep my mouth shut, so that at least the protection of the nasal filter might be employed. We are now assured by the most careful students that the extinction of tuberculosis—which will one day certainly follow plague and leprosy in this country—can never be effected until the public-house is either abolished or radically transformed. As for children, notwithstanding the limitations of our subject, it is surely warrantable to quote the opinion of Dr. Davies, that an hour

in the public-house is worse than¹ twenty-four hours in the tuberculous home, and that it is far easier to keep the children out of the public-house than to keep such places free from infection.

Having thus discussed the most recent discoveries of science in regard to this question, and the experimental facts upon which they are based, conclusions let us briefly define the practice of a reasonable man in this matter. I do not say the professional practice of a reasonable doctor, since that is outside my scope, though it is, I believe, a much easier question to answer. But what should the reasonable adult person do, assuming that he does not wish to pay for the happiness of to-day with the happiness of to-morrow? Now before we answer this question, it is fair to recognise that, as in the case of foul atmospheric gases and, much more markedly, a host of substances which we take in our food, so also in the case of alcohol, the body has powers of adaptation and self-protection, and can acquire a measure of immunity. If we do not recognise this fact, all our other scientific conclusions will be apt to be discredited by the positive experience of cases where men have habitually consumed more or less alcohol and have lived and thrived to great ages. But though it would be foolish to ignore these cases, it would be equally foolish to assume that they serve as models for all of us, and that because these persons were capable of limiting their consumption of alcohol, or felt no tendency to increase it, therefore we may count on the like advantages.

The broad conclusion, beyond question, is that there is only one method of absolute safety, and this is not to touch the thing at all. It is necessary for no one, for no living thing, except the microbes that decompose it into acetic acid, and no one is the better for its habitual consumption even in the smallest quantities.

As regards all forms of spirits this conclusion needs

no qualification whatever. As regards the lightest wines and beers, it is necessary to admit that in parts of the world, such as Italy, let us say, where your chance of taking typhoid with your water is no small one, you will do well to choose the lesser evil. We may also admit that in the case of lager beer this evil is an exceedingly small one for such fortunate persons as certainly constitute the majority, and who are so constituted that in ordinary, or perhaps even in extraordinary, conditions they will never acquire a craving to go further. But there do exist many people of neurotic constitution, often people whose parents were drinkers, to whom the relation of alcohol is that of blood to the tiger cub. Once let them taste it, and they are done for, or in grave danger of being done for. It would be almost desirable, indeed, to discuss at length the very obscure though very important and interesting subject of the inherent variations between people in this respect—variations dependent not upon strength of will, whatever that may mean, nor upon moral training, but upon the chemical constitution of the body. There are those who run no risk because the drug has no action upon them at all; there are those whom it violently upsets, and who are thus protected; there are those who like it in some small quantity, and who will never exceed this, parallel instances being found in the case of tea, coffee, and tobacco; there are those who are predestined to fall. These last are probably more numerous than ever before; they include many of the most valuable members of the community, the most original, versatile, individualised, inventive, creative—people who have points of view, parents of ideas, potential poets, musicians, enthusiasts, seers—the salt of the earth, the makers of progress, the neurotic people who do the *pioneer* work of the world. Perhaps the chief indictment against alcohol from the point of view of human

history in general is its relation to such people. The more vegetable and stolid and phlegmatic and average the reader whom I address, the less important are these considerations for him, but the higher his type the more urgent are they. As he values himself, let him take heed.

On the other hand, the likely victims of alcohol include the feeble-minded and mentally defective of many kinds. In a sane age parenthood will be forbidden to such; and at least the chronic inebriate will be segregated. But the terrible relations of alcohol to race-culture, really more important than any personal question, cannot be discussed here.

BIBLIOGRAPHICAL NOTE.

The reader may desire to refer to authorities for the very positive statements of this chapter, which go to contradict so wholly popular and even professional practice. The following amongst many scores may be commended:—

“Alcohol and the Human Body.” By Sir Victor Horsley and Mary D. Sturge, M.D. Macmillan, 1907.

“Alcoholism.” By W. C. Sullivan, M.D. J. Nisbet, 1906.

“Hygiene of Nerves and Mind.” By Professor August Forel, M.D. John Murray, 1907. (Translation.)

“The Hygiene of Mind.” By T. S. Clouston, M.D. The New Library of Medicine. Methuen, 1907.

“The Drink Problem.” By fourteen medical authorities. The New Library of Medicine. Methuen, 1907.

“The Influence of Alcohol and Other Drugs on Fatigue.” By W. H. R. Rivers, M.D., F.R.C.P. Arnold, 1908.

Then, if the reader is interested to hear what can be said on the other side, he may turn to a volume

entitled "Alcohol, the Sanction for its Use, Scientifically Established and Popularly Expounded by a Physiologist." Translated from the German of Dr. J. Starke (Putnam's Sons, 1907). We are not informed as to the author's credentials, but it is a book to laugh at—if the question were not so deplorable. The author appears to be acquainted with none of the recent work on alcohol. He makes no allusion to the work of Metchnikoff and his followers, nor that of Kraepelin and his followers. In one place he describes alcohol as a narcotic, which it is, but elsewhere he regards it as a stimulant. In order to balance the utterly unscientific nonsense which he writes about alcohol, he roundly and with no less absurdity condemns tea and coffee. These can only safely be consumed, he says, if sufficient alcohol be taken to neutralise their bad effects! The total abstainer from alcohol who has drunk half-a-dozen cups of coffee every day of his life for at least fifteen years, such as the present writer, may well be astounded. Our author's rule of life is "always more alcohol than caffeine." As for infectious disease, our ingenious writer makes no allusion to it from cover to cover. Indeed, if any proof were needed of the case against alcohol to-day, this volume would clinch the matter. Thus in its way it is a treasure, and I should be sorry to lose it from my shelves, where it lies next Sir Victor Horsley's volume, with which it may be contrasted and compared.

TEA, COFFEE, COCOA AND TOBACCO

IF by any chance the reader is a food faddist, or even if he is not, he may be already wondering at the sense of proportion which leads a writer on personal hygiene to deal with impalpable—and therefore unimportant—things like air and light before the food question, and then actually to discuss at length certain articles of consumption before dealing with the great question of food in general. This is all, however, of deliberate intent. The more one studies the food question, the less is the importance one attaches to it. This is indeed part of the more general proposition that the more you study the human being as a whole, the less is the importance you attach to education—which is *the provision of an environment*, including food—and the more to heredity. The reason why every school of diet proclaims and obtains, in greater or less degree, much the same results as any other, is that the inherent factor is immeasurably more important than the external factor. Whatever kind of food, within extraordinarily wide limits, you give to John Smith, he will turn into John Smith; he will never turn it into a Herbert Spencer. A John Smith is born and not made, as a Herbert Spencer is born and not made. Food makes nothing, but *is made* by the organism into *itself*; the nature of the self is given first. The only possible reply to many of the people who seek freedom from dyspepsia or bodily energy or mental vigour from this or that diet is, "Ye must be born again," and born different. The criticism on this dictum is to be determined not by whether it is pleasant, but whether it is true—not even by whether it ought to be true.

But if the food question in general has scarcely a tithe of the importance we usually attach to it—as I believe will be generally recognised in another twenty years—it is quite certain that the cardinal and natural

distinction between that which is a food and that which is not remains, and remains important. Things taken into our body, not being foods, may sometimes be merely neutral, such as the nitrogen which we inhale at every breath, and of which the blood always contains a quantity. That is not a food, but it is not anything else so far as the body is concerned.

On the other hand, there are many articles of diet or consumption which are not foods, but are not neutral. They are taken, one and all, for their effect upon some part of the nervous system—which is, of course, the seat of all appetite. There are condiments, for instance, such as mustard and pepper. (Salt is a necessary food, and only happens to have a salient taste.) And there are also the substances named at the head of this chapter. Tea and coffee may be considered together as essentially the same.

The difference between tea and coffee depends upon the presence of different volatile oils, as they are called, in the two cases. These oils ~~Tea and~~ are not entirely without action as drugs, ~~coffee~~ and constitute the obvious attraction, owing to their taste and flavour. There is a certain amount of idiosyncrasy in respect of their action, and directly we venture to lay down the law it is only to encounter someone who believes that tea keeps him awake, but coffee never—and so finds it; there being one part of nature in which beliefs determine facts, but one only. In other instances the idiosyncrasy may perhaps not depend upon belief only, but in any case it is not necessary for us to do more here than note the existence of these volatile oils in tea and coffee, and then proceed at once to their essential constituent.

One had almost added “for which in the long run they are taken.” Observation, however, on the effects of hot water (or, perhaps one should say, on the effects of heat internally conveyed by water) strongly suggests

that the characteristic effects of tea and coffee might often be obtained if their specific stimulant were wholly omitted, especially if the omission were not brought to the drinker's attention. Many an invalid who is forbidden tea or coffee obtains all their effects, except the possible effect of interference with sleep, by drinking hot water. I am inclined to suspect that the reason why one does not have to increase the dose of tea or coffee is that their effects are much more largely due than we usually suppose to the fact that they are commonly taken as hot fluids.

At any rate, the special constituent of these beverages is a remarkable alkaloid, a pure stimulant, which is sometimes called theine and sometimes caffeine. The latter name seems to be more commonly used, but the thing is one and the same in both cases, just as gold is gold in sea-water or in quartz.

So long as alcohol is called a stimulant, and similar drugs are called stimulants, it will remain impossible for people to understand the fundamental difference which obtains between the employment of alcohol and other narcotics, on the one hand, and that of tea or coffee on the other hand. Medical men are misguided by words, like the rest of mankind. When, however, we discover that caffeine is a pure stimulant with no second stage of depression, when we learn that (so far as I am aware) no one has ever poisoned an animal with caffeine, we shall begin to look at the thing rightly. It is curious that the pharmacologists of a few years ago, and one or two of them who survive to-day, call alcohol and caffeine stimulants without being able to discover for us what is the lethal dose of the latter. Some of the few defenders of alcohol who really endeavour to argue have much to say in condemnation of tea and coffee. But there is probably no such thing as "théisme" or *caféisme*." The words, I admit, exist, but that is not quite the same. One offers a challenge,

then. Let these controversialists, if they wish to be thought honest, inform us as to the lethal dose of caffeine, or let them show us under the microscope *any* results whatsoever of the long-continued action of caffeine; let them point to a single tissue change, to a single symptom complex worth mentioning, to a single crime or death. They cannot, and they know they cannot, and one wonders why one notices them at all.

But it is well worth while to be sure that we drink these beverages under proper conditions.

For practical purposes tea consists of two things—the first being tannic acid, also known as tannin, and the second the alkaloid already named. Tea and
tannin
 The tannin, or tannic acid, occurs in the tea leaf as in so many other plants; it is less readily soluble than the caffeine, and is much less readily obtained from the Chinese leaf than from the Indian, the latter, together with the Singhalese, containing much more of this substance. Tannic acid has no attractions for the palate, except in the case of people who like a little bitterness, and it has no action on the nervous system, none of it, indeed, being absorbed by the body. Its action upon the tissues with which it comes into immediate contact is wholly deleterious. I do not say that it is necessarily serious, but what action there is is wholly bad. Notably does it interfere with the digestibility of food-stuffs. Plainly, therefore, a chief concern in the production of the best beverage from tea should be reduction of the tannic acid to a minimum. This is to be accomplished, first, by using the leaf which contains least of it, and, secondly, by sharply limiting the length of the infusion. It has been clearly proved that practically all the caffeine that can be obtained from the leaf is obtained in the first three minutes, whereas the amount of tannin increases markedly, even between the twentieth and fortieth minutes.

In the opinion of not a few, the said tannin is largely responsible for the deleterious effects frequently attributed to the caffeine. This last is an invaluable ingredient of tea; it is the same substance as that which gives its value to coffee, but is present in less abundance in the tea leaf than in the coffee bean; it is a nervous stimulant of the purest kind, and belongs to an entirely different class from the pseudo-stimulants such as alcohol. In some ways this is one of the most remarkable of all known drugs; it appears to be unique, in that it stimulates the functions of the cerebrum, the highest portion of the brain, without inducing any subsequent reaction that can be detected. It has no second stage of action comparable to that of alcohol and opium, and in cases of emergency it is capable of postponing sleep for hours, and, more than that, of maintaining the mental activity as in the daytime. It may be confessed that, in preparation for an examination, I systematically used caffeine for weeks on end, in *fifteen-grain* doses of the simple citrate, without any deleterious results; but this is quoted for illustration, not imitation.

Now it is plain that, so far as the remote consequences of a cup of tea are considered, it is the caffeine that we desire, and the tannin that we do not desire. The relative solubility of the two substances exactly suits our convenience. If it were necessary to extract all the tannin in order to get any caffeine, there might be some excuse for the lady who likes her tea to have a little "body" in it, or for the servant-girl who keeps her teapot on the hob all day. But the fact is that it is possible to obtain all the caffeine desired, whilst reducing the amount of tannin to a minimum. At present the public taste is thoroughly vitiated; no one who has given the matter a fair consideration, or who cares to admit any palatal delicacy at all, will question that the fine aroma of a cup of properly-made Chinese tea is in a different category altogether from the sen-

sations aroused by the concentrated solution of tannin which is usually offered under the pseudonym, "a cup of tea."

First, then, the tea should be made from the China leaf, but this is of less importance than the actual method of infusion. It is not the com- The use of tea position of the leaf, but the composition of what is drunk, that matters. The briefest possible infusion is sufficient to extract all the valuable caffeine from the leaf, whereas there is a distinct difference between the amount of tannin contained after three minutes as compared with five. The dose of caffeine in an ordinary cup of tea is about one grain. The following hints for making tea are drawn from Dr. Hutchison's invaluable work, "Food and the Principles of Dietetics":—

"The tea should really be *infused*, not boiled or stewed, as is so often the case. The character of the water is of the first importance." The Chinese regard as best the water from a running stream, and as worst well-water. "The meaning of this is that the water should be well aerated. Prolonged boiling makes it flat by driving off the dissolved air. Hence the water should just freshly come to the boil. If it is already flat, it is a good plan to pour it into a jug from a height, for this causes it to take up some air again." The water should not be too hard, and, if only hard water is obtainable, a pinch of baking-soda may be added to the teapot. Tea-tasters employ a smaller proportion of tea than is indicated by the ordinary domestic rule. The teapot should be thoroughly heated, "for it is only at the boiling-point that some of the volatile constituents of the leaf, to which the beverage owes its aroma, can be properly extracted."

The infusion should not last longer than four minutes. After this too much tannic acid is extracted, as well as bitter substances which we are better without.

Further, "prolonged infusion dissipates the volatile oil to which much of the fragrance of a good cup of tea is due." After infusion the fluid should be poured into another hot teapot. The use of milk is perhaps desirable, as it disposes of some of the tannic acid of the tea. "All second brews should be avoided, for a single infusion is sufficient to remove from the leaves all the useful constituents of the beverage."

Tea thus made is delicious; whether on account of its caffeine or its heat, or both, it is refreshing; it cannot injure the digestion, though possibly in some cases the addition of sugar to it may do so; and it may be questioned whether there is any necessity to forbid its use by any one except the victim of insomnia, caffeine being the only known drug which, by a direct action upon the brain, promotes the activity of which sleep is the negation. In Great Britain we consume about four million gallons of tea every day, and in Australia the amount consumed per head is half as high again as in Great Britain. With this almost incredible consumption it is impossible for the opponents of tea, who oppose tea merely in order to befriend alcohol, to point to any bad effects whatever other than those dependent upon the circumstance that tannic acid interferes with digestion, and is largely contained in improperly-made tea. A writer who personally likes champagne and is indifferent to tea may be assumed to write without prejudice.

We must not be too prolix in dealing with coffee, for there is a risk of writing almost without end if the details of roasting and the like were considered. The seductive ingredient in coffee is its characteristic, powerful, and volatile oil: even more delicious, perhaps, to the nose than to the palate. This caffeol is, like other volatile oils, a stimulant in some degree. It appears to be the ingredient which upsets some people so that they cannot drink coffee.

The proportion of caffeine in coffee does not differ so much as one might suppose from that in tea, as each is usually drunk. That is to say, that according to Dr. Hutchison, "a breakfast-cupful of *café au lait* is composed of about one part of black coffee to three of milk, and will not therefore contain more of the alkaloid than a teacupful of tea." He, however, who drinks his coffee black and abundantly, manages to obtain a good many grains of caffeine every day.

In order to make good coffee one must use enough; it should be freshly roasted; ground at home the same day as it is drunk; the same conditions as to the water and its boiling should be observed as in the case of tea; and the infusion should be made in an earthenware vessel. Complicated apparatus is to be criticised as unnecessary, and as liable to contain vestiges of stale coffee, which are quite sufficient to ruin the new brew. No methods of filtration are necessary if the coffee be stirred and allowed to stand a little.

If one is to be absolutely fair—not so easy for a writer who loves coffee—it must probably be said that some of us drink too much coffee. The oil is not impotent; the caffeine is certainly potent and abundant. The judgment of these cases cannot be by rule of thumb, but by results. At the slightest hint of impairment of digestion, or of the power to sleep deeply, certainly, and promptly on going to bed, one should cut down the consumption of coffee.

For it is fair to recognise that, as the position of this chapter indicates, we are dealing with substances which are essentially drugs and superfluities. They are not necessary to health; they are in no proper sense of the word foods any more than alcohol is, and they must therefore be judged stringently with a ready eye for any objections.

Cocoa is a substance in whose favour one is prejudiced, not for any personal liking, but because one or

two of its manufacturers in Great Britain, such as Mr. Cadbury and Mr. Rowntree, have led the way in the decent treatment of their workpeople and in the fight against alcohol. But this must not permit us to favour cocoa unduly, or to assent to some of the perfectly monstrous statements which have been made in its favour.

For practical purposes cocoa is to be regarded as a slightly stimulant beverage, closely allied to tea and coffee. Apart from flavouring matters, its specific ingredient is an alkaloidal drug named theobromine (from *Theobroma*, the food of the gods, the generic botanical name of the cocoa plant). This alkaloid is closely allied to caffeine chemically, but is much less potent as a stimulant. The proportion of it in cocoa is very similar to that of caffeine in coffee. Apart from the fact that cocoa upsets the digestion of not a few people, its composition may be practically ignored. It appears to be the fat of cocoa which usually upsets digestion. Directly we add milk and sugar to cocoa, the beverage comes to have a serious food value. Apart from this, however, it is not seriously to be considered as a food. Widely advertised statements, such as, "there is no better food," are monstrous, and without a vestige of excuse. Dr. Hutchison calculates that it would require seventy-five breakfast-cupfuls of cocoa to yield the total amount of potential energy demanded of the body daily—obviously an impossible quantity. If the gods really lived on cocoa, they have died of starvation long ago.

For practical purposes cocoa need not seriously be regarded as a food any more than tea, coffee, or beef extracts. Its action on the nervous system is negligible. It may possibly have some slight value, as tea and coffee certainly have, in stimulating the kidneys.

Cocoa and chocolate may be permitted to children, but they should certainly have neither tea nor coffee.

Caffeine is a drug, and a drug of a kind for which the naturally active and sensitive nervous system of a child has no need. Besides this, sleep is more likely to be interfered with in the child than in the adult by this drug.

We may deliberately consider tobacco here, notwithstanding the circumstance that it is usually smoked, whilst tea, coffee, and cocoa are drunk. The use of This is a mere matter of detail. In either tobacco case the result is to introduce certain substances into the blood, and in all the cases the characteristic substance is in no sense a food, but a drug. This arrangement of the subject is therefore a proper one, and the three alkaloids contained in these four substances are rightly to be considered after the drug to which the last chapter was devoted.

We may note in passing the astounding fashion in which public and political opinion are guided in Great Britain. In this country, where many or most public-school boys are regularly given beer, and where children are freely taken into public houses, the relatively trivial question of the poisoning of childhood by tobacco has received legislative attention. The obvious explanation is, that the tobacco interest does not dominate the State, and that the adult is quite prepared to accept legislative proposals which cannot by any chance interfere with his comfort.

The characteristic alkaloid of tobacco is one of the most powerful of poisons, a volatile liquid called nicotine, of which one-third of a grain has killed a man. The oily mess which accumulates in a pipe is not nicotine, or one's first mouthful of it would certainly be one's last. All the nicotine in the tobacco that is burnt at any moment is destroyed, and probably the heat is enough to destroy all, or nearly all, the nicotine in the tobacco that is just about to be burnt. Hence it has been stated that tobacco smoke contains

no nicotine at all. This, however, is not the case, for the poison is volatile, and as one draws in a mouthful of smoke one draws in with it a certain amount of nicotine, in the form of a gas, derived from some part of the tobacco between the lips and the part undergoing combustion. Though the proportion of nicotine in tobacco smoke is extremely small, the potency of the poison is sufficient to endow it with marked effects. These effects depend not upon the entrance of nicotine into the mouth, but upon the amount of it that actually circulates in the blood, just as we live not by what we eat, but by what we assimilate. The amount entering the blood must depend, other things being equal, upon the amount of absorbing surface which is exposed to the smoke. Necessarily very much less nicotine is absorbed from the mouth than may be absorbed from the lungs. This is the reason why the practice of inhaling the smoke of cigarettes is so extremely undesirable. The habit is one of which few people can break themselves, and it is highly desirable that the young smoker should be warned not to acquire it. As long as one has never inhaled, smoking is just as enjoyable—and far safer—without it.

The fact that tobacco is a poison is no more disputed by any one now than the like fact regarding alcohol will be disputed twenty years hence. It is curious that the people who argue that alcohol cannot be a poison because so many people take it without apparent injury, do not apply the argument to nicotine, which would show its absurdity. Nicotine is no less a poison because the adult is usually capable of acquiring a complete immunity to its action. The period of adaptation or acquirement of immunity may not be without its bad quarters of an hour, but it does not necessarily follow that the cost of adaptation is too high when weighed against the advantages which so many of us gain, or seem to gain, from to-

bacco. As to juvenile smoking, no word of defence can be said. The excuses or warrants for the uses of tobacco do not apply to the child. We smokers argue that tobacco increases our sense of well-being, or that it favours digestion, the action of the bowel, and so forth. These arguments do not apply to the child. But though the regular smoker has every reason for making the best possible case for tobacco, the truth must be told, that the satisfaction we obtain is precisely the same in essence as that obtained from his alcohol by the drinker, or from his morphia by the morphino-maniac. The naked fact is, that this is the satisfaction of an artificially-acquired, if, indeed, we must not say morbid, craving. The drug is a poison. Evidence seems to show that it is probably a poison to all forms of life, just as alcohol and prussic acid are, though both of these are produced by living creatures more or less indirectly. If close enough inquiry were made, we should probably find that, as is known in the case of morphia, and as is doubtless true in the case of alcohol, the poison produces secondary products which require a further dose of the poison as an antidote to them. Thus a vicious circle is initiated, the details of which have been apparently fully worked out in the case of morphia, and which notoriously consorts with the general experience in the case of these various narcotics. Thus one may point out *seriatim* quite a number of beneficial results which are palpably obtained from smoking, but it has to be admitted that these good results are essentially of the nature of neutralising the secondary effects of previous smoking.

Excessive smoking often disorders the nervous apparatus of the heart; very excessive smoking, and especially chewing, may cause a definite form of nervous blindness, happily always curable, as tobacco-heart is curable when the smoking is stopped.

Both tobacco-smoking and opium-smoking have one great advantage over the use of alcohol. Morphine and nicotine are nerve poisons as certainly as it is. But so far as we can discover they have no remote irritant effects. You do not find in the brain-cells of the morphino-maniac or the most incorrigible smoker any visible changes. There is none of the local irritation which is associated with alcohol everywhere. In the case of morphia there may be the most disastrous action upon function, but there is none upon structure. Thus it seems that neither morphia nor tobacco causes any morbid condition which is not certainly and rapidly relieved when the use of the drug is interdicted. No organic changes being caused, the evil consequences disappear when the poison is supplied no more. The question of the ease or difficulty of stopping a drug habit, which smoking palpably is, doubtless remains. But it is well to remember the immense practical distinction between drugs which work no permanent tissue changes, and those which do. A nerve cell once destroyed is destroyed for ever. Tobacco is a sedative to the racial instinct, which coffee stimulates.

The obvious reply to the man who wishes to reduce his smoking, is that he should "use his will-power." "Will-power," however, occurs in the conversation or writing of any individual in exact proportion to his ignorance of psychology. Whatever reality the term corresponds to is certainly something very different from what those who use the term conceive. Even if there were an entity called the will it would be idle to regard it as incapable of being helped or hindered by external circumstances. One or two of these may be noted in this relation. A physician has told us that he orders the over-smoker to use only a long clay pipe. There is no virtue in this pipe, except that it can only be smoked at home, and so the amount of smoking is reduced.

Then, one may make a rule about smoking only after meals, just as the rule may be made not to drink between meals. You may make a point of not carrying tobacco upon your person; you may make yourself a weekly allowance of tobacco not to be exceeded.

It is said that *nux vomica* is useful in this relation. It may be the bitter taste of the tincture which serves to satisfy the palate, or the strychnine may possibly perform some remoter service. The sucking of strong peppermint is reported to be really very useful in reducing the desire to smoke. This seems thoroughly reasonable, both as regards the action of the volatile oil upon the nervous system, and as regards the vicarious satisfaction of the nerves of taste and smell.

Sir Lauder Brunton quotes evidence to show that there may be danger in substituting one kind of tobacco for another—the danger of a sudden faint, which in some cases may be final. There are many other poisons in tobacco besides nicotine, but their nature and proportions vary, and it may quite well be that one has established immunity to one kind of tobacco and not to another.

The common belief that blind men do not smoke, and that one smokes only for the pleasure of the eyes, is obviously absurd considering the potency of the drug in question, and is abundantly contradicted by inquiry amongst the blind. Any measure of truth in it will concern those smokers in whom the satisfaction of the sense of taste is predominant. As every one knows, one can scarcely taste in the dark. But when one has become accustomed to the dark, as the blind man does, the sense of taste learns to do without the accessory stimulation of the nerves of sight. The blind man eating his dinner enjoys it as you do, and very much more than you would if you had to eat it in the dark, as he does.

IN PRAISE OF MILK

LET us, at least in one chapter, ignore the many controversies, mostly vain, on matters of diet, in order to consider the virtues and the protection of what is incomparably the best food in the world. It may indeed for practical purposes be described as a perfect food without any reserve worth mentioning. Yet apparently nothing will make the public believe this. In the first place, we are tired of hearing the praise of a food which is insipid. It is natural enough that milk should not appeal to us who scour the ends of the earth for innutritious condiments wherewith to season our food. Having thus debased the appetite we find it hard to credit the virtues of a food which makes no appeal to the vitiated palate at all. How much wiser and more valuable was the appetite of any of us when he or she was but twenty-four hours old. Did we then complain that milk was insipid? On the contrary, the slightest hint of a foreign flavouring matter in milk—due, for instance, to the medicinal use of some essential oil by the nursing mother—may be sufficient to make a wise child refuse the breast. Therefore, until at last we learn that hunger or appetite should be an organic demand arising primarily in the state of the blood, and not a desire for palatal irritation, we shall most of us be prejudiced against the ideal food which Nature has provided and on which she has reared mankind, but to which she has chosen in her wisdom to add no condiments.

The second more or less conscious objection to accepting the physiologists' praise of milk is based on the fluidity of milk. The doctor asks his patient, "Well, what have you had to-day?" "Nothing at all," replies the patient or friend. "What, no milk?" "Oh yes, I have had some milk," is the reply. You may hear such a conversation in almost

any sick-room. The nurse has persuaded the patient to take some milk, but of course that does not count. Of all the quaint notions to obtain amongst a species of mammalia this is surely the quaintest. It might have some vogue amongst the birds or reptiles, but who can explain its prevalence amongst an order of beings distinguished by and necessarily dependent for its amazing success upon the production and use of milk? It really seems that, in some measure, the public judges by the physical state of a food. We speak of "solid nourishment." If, however, a thing be liquid, it is not to be taken seriously. Thus the presumption is in favour of cabbage as against milk. One may point out that, on entering the stomach, the solid matter which abounds in milk is precipitated or curdled; and yet further, one may observe that all food whatsoever, if it is to be absorbed, must first take a liquid form. The process of digestion is, amongst other things, a process of liquefaction. No liquefaction, no absorption, certainly.

The reader, however, will realise that I am hard pressed for an explanation of the public inappreciation of milk, since it is notorious that other liquids have only to be advertised for the public to credit them with amazing virtues. A substance like beef extract, which contains no particle of food material, is believed in; perhaps because it is supplied in a more or less solid form, and when dissolved is known to have been solid once. On these grounds one may suppose that powdered milk should serve to enhance the prestige of milk in general, demonstrating, as it does, that there is "solid nourishment" in milk, however fluid its form. This acceptance of solidity as a criterion of nutritive power requires to be exploded. The invalid who is dying for need of nourishment is not offered milk, but some wretched soup or jelly, the basis of which is the peculiarly innutritious substance called

gelatine. When reproached, the attendant remarks that surely the soup or jelly must be splendid stuff, for, lo and behold, it will set when cold. So also will water when cold enough. There is a slight difference in freezing-point between gelatine and water; but what has that to do with it? Is it not curious that, as I surmise, the making of a remark like this, even in the twentieth century, may still be useful. I am hoping to turn an honest penny shortly, on this analogy, by sending a copy of the alphabet to a publisher.

Do but consider for a moment the wholly unique presumptions in favour of the food-value of milk.

The only
natural
food

Consider any other substance that we consume, and you will observe that the probable argument against it is the same as that advanced against the probable utility of any vegetable drug as compared with the few really curative drugs of animal origin. We eat potatoes, but potatoes were not made for us, an obsolete theology notwithstanding. They are food reserves for the potato plant. We eat sugar, but this was not made for us. It is a store of energy for the sugar-cane and the beetroot. We eat the muscles of the sheep, which we call mutton; these, however, were not made for us, but in order to serve the sheep's need of locomotion and respiration. We eat eggs, but the egg exists for the propagation of the race of fowls, not for the service of mankind. I am not asserting that it is not part of the natural scheme that animal and vegetable species should feed on each other, but that neither they nor any of their parts were called into being in order to serve the life of creatures of other species than themselves. In the whole of Nature there is no product evolved for the purposes of a food excepting milk alone. Even honey is derived from substances formed not to feed the larva of the bee, but for the purposes of the plant. There is, therefore, an enormous presumption in favour

of this substance as a food. Search earth and sky, the inorganic and the organic world alike, you will find that only once has Nature set out to make a food—something which exists in order to be a food, and for no other purpose. You cannot say this of the sheep or the egg or cauliflower.

Having made only one effort in this direction, Nature has turned out a masterpiece. Milk is the characteristic food of the mammalia, of whom we are the last and first. The last shall be first in the principle of evolution, you know. The mammalia are the dominant creatures of the earth, lords of the living world. This would remain true of them even if they had not produced man. The mammalian dependence upon the milk produced by the mammæ or breasts of the mammalian mother is absolute. No mammal ever reached maturity without milk. The dependence of the human animal on this substance is greater than that of any of his predecessors. No milk, no man. Yet this unique substance, historically necessary for the evolution of the human race, now as ever necessary for the evolution of every human individual, incapable of replacement by any substitute, is still so far from being adequately appreciated, whether in its form of human milk for the human infant or as the milk of lower animals stolen for the purposes of mankind, that not only do we constantly, both in health and disease, spend our money on that which is not milk—a far more significant phrase than “that which is not bread”—but also we slay and are slain in millions, every year, through our neglect of the precautions necessary to prevent its corruption before use. That great phrase derived from Aristotle *corruptio optimi pessima*—the corruption of the best is the worst—seems to come fitly to the mind on whatever subject one writes or thinks. It is true of religion; it is true of woman; it is true even of milk, which when pure is an incom-

parable food, and when corrupt is an incomparable poison.

Therefore, one must offer a plea for some sense of proportion in our treatment of three typical fluids, Water, beer, water, beer, and milk. As I pointed out and milk three years ago, there is an astonishing lack of correspondence between the amount of attention respectively paid by the public to their purity, and the measure of attention which they respectively deserve. As to safeguarding the water supply, every one is adequately, if not more than adequately, educated—which is more, I think, than can be said on any other matter of hygiene, from safeguarding the air supply downwards. The greatest public alarm is manifested concerning accounts of quite innocent impurities in water. There are many forms of vegetable life, the presence of which in water cannot do anything but impart to it a small food-value. The dangers inherent in drinking water are grossly exaggerated by advertisers who figure wholly imaginary microscopic views of pure water and ordinary drinking water, the latter containing forms of life assumed to be virulent, but wholly unknown to any student of natural history. They most closely resemble aerial insects, and are probably in part responsible for the public delusion that microbes have legs and wings. If, however, we turn from these fictions to facts, we find that, for practical purposes and apart from such possible accidents as invasion by cholera, there is only one disease of an infectious character which water is liable to convey, namely, typhoid fever. In such cases some one has been criminal or criminally careless, but, except in epidemics of typhoid, there is little need for us to worry about our drinking water. I should no more dream of filtering mine at ordinary times than of allowing a child in my house to drink ordinary milk. The question of lead-poisoning is, of course, highly

important, but it does not affect the present argument.

Similarly, we spend much trouble in discussing and trying to insure the purity of beer. A Pure Beer Bill comes regularly into the House of Commons, offering members superfluous opportunities, always taken, for making fools of themselves. And, at the time of writing, a Royal Commission on Whisky is now sitting to discuss the purity of a notorious poison. Thus we pay far more attention to the purity of beer and of whisky which, when absolutely pure, slay millions, than to the purity of milk which, when impure, slays millions, and when pure is the only perfect food—the only food the only function and purpose of which is to be a food. What more amazing instance of swallowing a camel and straining at a gnat can be conceived?

Lucid intervals there are even in the public mind. We do realise that there is something in milk other than water, even though it is not “solid nourishment,” for we object to the addition of water to milk. Until quite lately,

What is
“pure”
milk?

it was probably fair to say that by pure milk the public understood milk that had not been diluted with water. True, it might be swarming with virulent bacilli of tuberculosis and diphtheria and typhoid, and half-a-dozen diseases more, but as long as the dairyman had not added water to it, nor taken cream from it, it was pure milk. But gradually we are learning wisdom in this respect. We know now that the mere dilution of milk with water is quite the least injury that it can suffer. We know, on the other hand, that enormous quantities of milk sold even by reputable dairies contain ready microscopic proof of the presence of the excrement of cows, whilst about ten per cent. of samples of milk consumed in London to-day contain living and virulent tubercle bacilli. Thus when next the reader hears talk about the purity of water, or prattle about the purity of beer, let him ascertain whether the

speaker has any sense of proportion and knows what infected milk accomplishes in civilisation to-day. Meanwhile, if he has children in his own house, and is unacquainted with the history of the milk which is supplied to them, let him thank himself for trouble—say, in the glands of the neck—if not for much worse.

The whole question of the milk supply may be regarded by the present reader as having no direct bearing on himself, but as concerned merely with infant mortality, the crippling of children by tuberculosis, and so forth. This is not so. In the first place, it is a matter of individual prudence to avoid unboiled milk of the history of which one is ignorant. It is a matter of individual duty for the householder to acquaint himself with the facts about this substance which may be bringing disease and death into his house at this very moment.¹ The matter is also personal because it is of national importance, and in affecting the life and health of the community, which are the only wealth of nations, indirectly affects every individual in it.

But it is also well to remember that milk is not merely a food for children. That which enables the **Milk for** babe and suckling not merely to grow, but **men** also to develop, is, *a fortiori*, still more able to maintain the adult. As the sole diet of adults, it would probably prove somewhat excessive in water, and, they say—but this may be questioned—somewhat deficient in iron. At any rate, as part of the diet of the adult, milk may well have a place. Though it be a food for babes, it will give as much strength as strong meat to men—and without any of the poisonous substances which are contained in meat and sold as food under the name of beef extract. It is milk, despised by the strong man when his need is least, that will save him in illness when his need is greatest and

¹ The best of human foods is also the best of foods for microbes.

when, on the usual assumption, it should prove itself more inadequate than ever. It may probably be proved that milk will enable any given racehorse to develop greater speed than will any other food. The racehorse is a mammal; we are mammals, and the best food for us at all ages, as compared with any other that can be named, is unquestionably milk. It has lately been stated that the use of milk has come into systematic employment in Japan, a land very poor in domestic animals, the cow included. The powers that be in Japan, having become aware of the value of milk, are purposely making it a staple of the national diet. It is certainly safe to say that the use of milk and its various preparations, such as powdered milk and the invaluable tonic foods of which milk is the basis, will steadily increase amongst civilised peoples—just in proportion as the present excessive use of meat amongst many of them will decline.

The work of alcohol apart, the most deadly of all human diseases is tuberculosis. The relation of human to bovine tuberculosis was naturally assumed. Milk and not long after the discovery of the tubercle tuberculosis bacillus by Koch in 1882. Some twenty years later Koch startled the world by asserting that the two diseases were wholly distinct, intransmutable and incommunicable. All the evidence accumulated since the promulgation of that view, not to say before it, seems to lead more and more strongly to its rejection. If we are to abolish tuberculosis, as would have been done already if man were primarily and not casually and in spots a rational being, we shall have to exclude living tubercle bacilli from milk, just as the living bacteria of Malta fever are now excluded from the goat's milk drunk by the soldiers and sailors in Malta, thus leading to the summary and total extinction of that disease amongst them. This recent lesson on a small scale, and in regard to a malady which is relatively trivial,

has been rightly acclaimed as a triumph for experimental medicine, and an argument in favour of its universal support. To my mind, its greatest use, were we wise enough, would be as an admirable working model of what (with certain other measures, such as the prevention of inter-human infection) might be expected to follow, and doubtless will follow, the introduction of an exactly parallel course in the case of the appalling disease which hurries some sixth or seventh part of all mankind into the grave. Six years ago, writing such words as these, one would have said in one's ignorance, "Now, if only enough people see this, they will drop all the rubbish that politicians talk about, and act at once." One knows better now, but still must say one's say.

IN PRAISE OF BREAD

YET a little longer may we postpone the dietetic controversies for which the reader is perhaps so hungry, and may devote a brief chapter to a second article of food about which no controversy of any real moment rages. The value of milk as an article of human diet cannot be over-estimated, as we have seen. Almost as much may be said for bread. It is well worthy of its name, "the staff of life." But whilst endless nonsense is talked and endless interest aroused by matters relatively trivial, the food faddist has little to say about milk and bread, which far transcend any other articles of food in their importance.

There is a special reason, also, why one should deal with these two foods before plunging into controversy, for each of them presents to the true statesman a national and social problem of the highest importance. So valuable a food is milk, so pre-eminent during the earlier, which are the more important, stages in the building up of any individual, that the establishment of a pure and abundant milk supply would be a greater national service, say for Great Britain, than any, perhaps, which the contemporary politician has in view. As for bread, we shall see at the close of this chapter that experimental biology or creative botany offers suggestion and hope of which the statesmen of the future will certainly avail themselves, when all the vain controversies about taxation have been forgotten.

A great argument in favour of vegetable food in general is its extreme cheapness when compared with any kind of flesh, or even with cheese and milk. In round figures, and roughly speaking, the cost of vegetable nutriment is about one-fourth that of animal nutriment. Foremost amongst vegetable foods are the fruits or seeds of certain grasses called cereals. We scarcely realise,

The
cheapest
food

perhaps, how great is the dependence of the human race upon a form of grass. The most important of the cereals is wheat, so far, at any rate, as Western civilisation is concerned; and this we usually consume as bread. The matter of cost has been put first, not because monetary cost is as important a matter as vital cost, but because, if the vital issues are satisfactorily answered, what we usually call the economic question is a really momentous one. It directly affects every individual for whom the cost of living is a matter of any importance, and it will some day be seen to be a matter of the greatest political importance. This, indeed, to my mind, is the most important aspect of all the food controversies. Individual attention to these matters is usually superfluous, often self-defeating and very often indeed ridiculous. But to discover and obtain the best and cheapest food supply for a nation would be a task of the highest. In terms, then, not of weight, but of nutriment, bread is the cheapest of all foods. Oatmeal runs it so close as to be substantially as cheap, but bread just has it. The comparison with meat may be worth noting. A pennyworth of bread yields eight ounces of dry nutriment, a pennyworth of meat only four-fifths of an ounce. But the different chemical varieties of food are of different inherent value, the kind called proteid being supremely important, since it is an absolute necessity of life. In terms of proteid, as distinguished from nutriment in general, wheat flour is still the cheapest of all foods, and bread, though much dearer than flour, is still much cheaper than milk, meat, or eggs. It appears that we pay the baker very heavily for his trouble, and that, so far as economy is concerned, it would be well worth while to bake at home. Says Dr. Goodfellow: "Bread is one of the cheapest foods, not only with regard to the actual weight of nourishment obtained, but also with regard to the variety of the nutrient constitu-

ents; and the purchaser who expends his modest twopence halfpenny on a two-pound loaf may rest assured that he could not spend his money to better advantage, except perhaps in the purchase of oatmeal, which contains slightly more energising nutriment than bread." If it be flour that is purchased, then the limit of economy has been reached. It will be evident that, as the population of the Western world persists in increasing at a rate which far exceeds that of the wheat supply, the fact that this is the cheapest of all foods will enter profoundly into the real economics of the next generation, which will probably realise the first and last of all economic truths, that there is no wealth but life, and that money-shifting is not economics.

It cannot be said of bread, as it can of milk, that it is a perfect food. 'The proportions of its constituents are doubtless perfect from the point of view of the young wheat plant, for which Nature designed it, just as the composition of milk is perfect from the point of view of the young mammal. Grass grows for its own sake, not for ours; and though, in the absence of the grasses, by far the greater part of mankind could not exist, yet the food we obtain from them is open to some criticism. Bread contains an excess, then, of energy-producing food, in proportion to its proteid—from which alone living tissue can be re-created. We also need somewhat more fat than the proportion in bread supplies. Thus, as Dr. Hutchison points out, "we make puddings with eggs and milk, and eat bread with cheese or spread it with butter." Evidently it is desirable that we should employ the methods of bread-making which involve least loss of the nutriment in the flour, and especially of those parts of it which are the more valuable and the less abundant. There is no question that recent methods which, unlike the older, do not involve the loss of the germ of the grain are a real advance in the

Composi-
tion of
bread

making of bread. The so-called "germ breads," then, are to be commended; "Hovis" flour, for instance, deserves a good word, because it includes the nutriment in the germ of the grain. A word may be useful as regards colour and moisture. We are entirely mistaken in acquiring an extremely white bread; the whitest is the starchiest loaf, and the least rich in proteid. Starch is a food, but very secondary to proteid, which is the invaluable part of bread; thus, in general, the cream-coloured loaf is more valuable than the pure white one. This is one of the little points which every housewife ought to know. As regards moisture, about four-tenths of a loaf is water. There should be a limit to this, assuredly, just as in the case of tobacco, or—to take a more serious instance—the case of milk. In general, indeed, legal limits should be put to the adulteration of many commodities with water. But bread is much less watery than raw meat.

There is, of course, a controversy about bread, but of a matter of very small importance. The bran and the germ of the wheat-grain contain brown and cream-coloured materials which will make a loaf brown. The supposition, then, is that the brown bread is more nourishing. In Great Britain there is actually a society which exists on this supposition to further bread reform. But the truth is that brown bread is a wetter bread, and you are buying such an excess of water that, in the upshot, you provide yourself with less proteid—very considerably less—and also less of the energy-producing constituents. Before we look into this further, it may be added that a common opinion regarding the crust and crumb of bread is also erroneous. The crust is very much superior on all counts without exception; probably because it is so very much drier. Only to consume the crumb of a loaf involves very great waste indeed. There are thus more reasons than one why we should mak

a point of eating our crusts, though the term "dry crust" is used almost as if it were equivalent to dry husk. It is dry because it contains so little water, which is another way of saying that it is in proportion more valuable. Also it is very good for our teeth and for our children's teeth. It now seems to be fairly clear, as we shall see later, that the real reason why our teeth are so bad is that we do not use them, an explanation entirely satisfying to the biologist, who knows that effort is the law of life, and that every organ, tissue, or function which has its work done for it—brain, stomach, tooth, limb, it matters not—inevitably degenerates.

In arguing about the value of different kinds of bread, especially as between white and brown, we stupidly ignore really interesting points—as that cooked bread or toast is more digestible and no less nourishing than ordinary bread, this being still truer of the kind of toast called rusks; and that biscuits are highly nourishing in proportion to their weight, since they contain very little water, and since the constituents added to the flour in making them are themselves valuable. According to Church, three pounds of biscuits contain about as much nourishment as five pounds of bread. But no; it is the question of white *versus* brown that we really care about, and we care about it wrong. One of the great features of brown bread is its inclusion of the bran. But this largely consists of cellulose, which the human body does not digest in any appreciable degree; and this cellulose encloses the other constituents of the bran. Two dogs and a hen between them were found to be unable to deal with bran effectively, and a large number of observers have shown that the percentage composition of whole-meal bread has no particular relation to its nutritive value. We live not by what we eat, but by what we assimilate. It seems that the cellulose is not only indigestible in itself, but

a cause of indigestibility in other things. In short, the bran of the grain is not worth using. The proteid of brown bread is not absorbed as it should be, and even other foods, such as milk, taken along with it, seem to have their absorption interfered with. Dr. Hutchison's conclusion is that there is no justification for recommending the use of whole-meal bread by growing children or nursing women, and that the vexed question of whole-meal *versus* white bread is finally settled in favour of the latter. "Had due regard been paid to the behaviour of the bread in the intestine instead of merely to its chemical composition, the Bread Reform League would probably never have come into existence." One may add that had due regard been paid to the behaviour of food in general in the intestine instead of merely to its chemical composition, three-fourths of all our dietetic controversies and controversialists would never have come into existence.

The importance of mastication, so much and so rightly insisted upon by many recent contributors to **How to eat** the subject of diet, is very marked in the bread case of bread. Digestion begins in the mouth, and the teeth are of great value in making bread practically useful. It is a mistake to eat new bread just because its consistence protects it from the teeth. It is so moist that it can scarcely be chewed, and cannot suck up the digestive juices of the saliva. It is largely because toast and biscuits and stale bread and crusts are dry that they are so useful. In the first place, the teeth can work upon them, and, in the second place, they soak up the saliva. Biscuits are much more digestible than ordinary bread in the stomach, and stale bread is much more digestible than new bread. On the whole, and as compared with other vegetable foods, white bread is extremely well-absorbed—best of all when it is taken with other kinds of food.

Everything goes to show that not only is man best suited by a mixed diet, but that—in health, at any rate—he profits best by a mixture of diets at any one time. A great deal of the salts of bread is unabsorbed, and an increase of the proportion of salt by the use of the bran of the grain is probably merely an increase in what is swallowed, not in what is used.

“Seconds” flour affords more value to the body than the so-called white flour or “patents.” The bread made from “seconds” flour is richer in proteid, but darker, and therefore erroneously distrusted.

Sir Lauder Brunton has an amusing explanation somewhere of the superiority of American dentists. One does not vouch for its truth, but the argument may remind the reader of an important fact. The American dentists are the best, he says, because Americans are so clever in the manufacture of machinery. Good machinery means white flour, lacking in proteid, and making no demands upon the teeth—neither feeding them nor working them: hence bad teeth; hence good dentists.

It is some years ago now since Sir William Crookes declared that Western civilisation was founded upon bread. The American reader can view **Bread and** this proposition without alarm so far as he **politics** himself is concerned. We cannot do so in Great Britain. The exportation of wheat from the United States is very shortly coming to an end, once and for all. The physiology of wheat in relation to the human organism will shortly become of momentous importance in Great Britain. We devote enormous areas of our little land to the preservation of game. There will some day be an end of that for the best of all good reasons—hunger. Enormous areas are in cultivation for the production, not of food, but of alcohol, not national wealth but national illth. The first statesman who arises in Great Britain, if ever one does, will see

this as a truth compared with which what we usually call politics is nothing but impudence. The time will come when we shall have to grow food in England as extensively and intensively as we can. That food will pre-eminently be wheat. If we grew wheat where we now grow whisky, we should be doing well for ourselves. Means are at hand whereby the farmer may hope to grow wheat in the same soil in successive years without interruption. That promises to be the contribution of modern bacteriological chemistry to practical dietetics. Further, the modern study of heredity on the lines discovered by Abbot Mendel, forty years ago, has enabled Professor Biffen of Cambridge to create a new wheat superior to anything hitherto grown in this country. There is reason to suppose that we shall shortly be able to produce wheat and other cereals containing, for instance, four instead of three rows of grains. It is on these lines that the real political economy is advancing. It is thus that the wealth of the nation will be increased, whatever be the opinion of the "blind mouths" for which we fight and paint and bedeck ourselves. The reader will, perhaps, forgive this intrusion of a more general question into a work on personal hygiene. But the real wealth of the nation to which one belongs affects in a hundred ways one's personal powers and happiness.

Some of the products of wheat are worth naming. It is well, at any rate, that we should know this invaluable food-stuff under its various names. The products of wheat They include semolina, macaroni, vermicelli, Italian pastes, shredded wheat, "force," and "grape nuts." The last two are excellent. They are whole-wheat preparations with malt, easily digestible, very cheap, and highly nutritious, the latter especially.

This chapter is entitled "In praise of bread," but we may well include here a few remarks about other

cereals than wheat; first, because some of these are of very great dietetic value, and, secondly, because the time is at hand when the relative value of one cereal and another, viz., wheat and rice, promises to play a part in human history.

Oats are highly valuable. Growing as they do in the north, they are somewhat rich in fat. The plant is adapted to its surroundings. A good source of heat is needed for a young plant that is to grow in high latitudes. Thus oats are rich in fat, whereas rice is poor. This is not a food for those whose digestion is delicate—that is to say, not unless it be specially prepared. There is too much of the irritant and innutritious husk in the ordinary oatmeal for use by invalids. Some of the recent rolled oats, such as Quaker Oats and others, may be commended for use by persons whose digestion is not strong. The method of preparation, however, somewhat reduces the nutritive percentages in the product. Oatmeal porridge is well absorbed, and there is no question that something must be said for this article of diet in explaining the observed size and strength of the typical Scotsman. According to the anthropologist he is the largest of men, but we cannot be quite certain that this is entirely a matter of race or heredity. There is indeed some evidence to the contrary. Jam and tea have lately begun to replace porridge in the diet of the labouring-classes in Edinburgh and other Scottish cities, and the products of this diet promise to be, not the largest, but amongst the smallest of men and women. Again, one may be forgiven for remarking that a change in the habits of the people, so great and so far-reaching as this, is the sort of thing which the real statesman or the real economist would lie awake at nights trying to find a remedy for. When one-thousandth part of the interest is taken in the food and development of human beings that is devoted to roses or pigs, racehorses, or

even, nowadays, bacteria, there will be less need for a writer on hygiene to make these protests.

Maize, or Indian corn, with its products "hominy," &c., is a very good cereal indeed, quite worthy to rank beside wheat and oats on most grounds. Like oats, it does not contain the constituent which permits the making of bread, but Dr. Hutchison points out that the "Johnny cakes" of North America compare very well indeed with good white bread.

Corn-flour is made from maize by a process which leaves practically nothing but its starch. Starch is, of course, a food, but of minor importance, and certainly no serious food for invalids. It should be relegated to the same inferior place as arrow-root, which is also mere starch, and has no status at all in modern invalid feeding.

Maize is very well absorbed, highly nutritious, and just about as cheap as wheat. Its introduction into Ireland at the time of the potato famine some sixty years ago was a real boon to that country. Dr. Hutchison declares with great force that, "in view of these facts and of the approaching scarcity of wheat, one cannot help a feeling of regret that maize is not more widely adopted as food amongst the working-classes of this country." We may best respond to the "bitter agonising cry" of Europe for cheap bread "by instructing the toiling masses of the old world in the excellence and cheapness of maize, and the proper methods of preparing it."

One cannot keep politics out of this question of food. After all, the struggle for existence is primarily the struggle for the food supply, which has been far and away the greatest factor in human history as that is ordinarily understood. At the time of writing, venal (not venial) ignorance, variously labelled, is trying to cajole the people of Great Britain into believing that the absence of some tariff, or the imposition of one, is

going to give them or obtain for them cheaper food. Publicists of one party actually have the face to try to persuade us that a tax on wheat, though it is a tax on food, will be compensated for by a reduction in the tax on other commodities, such as alcohol, tobacco, tea, and coffee; or that we need not worry about a tax on food since these things are taxed already. None of these four substances has any food value at all, whereas wheat is the staff of life. Is there not something that approaches to the loathsome in the manner in which the people permits itself to be gulled by the absolutely inexcusable ignorance of those who attempt to instruct it? A man who knows no more about food than is implied in putting wheat and tea, let us say, on level terms in this connection, may be the most sought after of leader-writers, or indeed the leader of a political party, but on food and everything that has to do with food he has no more right to an opinion than on the prognosis and differential diagnosis of chronic hypertrophic pulmonary osteo-arthritis. If he *does* know the alphabet of dietetics and physiology, then he is not merely a quack but a scoundrel.

Unfortunately money and power are not to be gained by doing anything real for the food of the people. If they were, or if there were a really seeing patriot in power, some of the elementary truths in dietetics would be applied in politics. The truth about maize, for instance, would be taught in schools. Experimental botany would be employed by the State, and so forth. This, however, would not necessarily mean making some one rich at some one else's expense, and is therefore not politics.

Barley is another interesting cereal which is of very considerable nutritive value, though inferior to wheat. Loaves made half and half of wheat and barley-meal are an excellent article of diet, however. These considerations show that the essential wealth of a country

—its human life, and the substances which serve human life—is augmented by any measure which favours the growth and use of wheat rather than barley. One refrains with difficulty from expressing an opinion regarding the growth of barley as a source of alcohol on soil which might be growing wheat.

There is no appreciable nourishment in barley-water.

Rice contains a very high proportion of starch, and is not particularly well digested. It is very much inferior to wheat on the score of proteid. The interested reader may refer to Sir William Crookes's book, "The Wheat Problem." It has yet to be decided, and history will decide, how far the chemical difference between wheat and rice is responsible for the difference between Western and Eastern civilisation so far as activity is concerned. It is not certain that our civilisation could be founded upon rice rather than bread; it is certain that, if indeed wheat is indispensable for us, only science can save us in the near future.

Rice is best cooked by steaming. It leaves a very small residue in the bowel. It should be eaten—as, for instance, in "risotto"—with substances which will supply its relative defect in proteid, such as eggs or cheese.

Having dealt, certainly at no greater length than they deserve, with milk and the cereals, we must now plunge, it appears, into the great food question—as many readers will think it—which has been purposely kept back in order that something like due prominence might be given to various other matters which do not receive one-thousandth part of the discussion, but are a thousand times more important for ninety-nine men out of a hundred.

FOODS AND APPETITES

"Of a truth if man were not a poor hungry dastard, and even much of a blockhead withal, he would cease criticising his victuals to such extent, and criticise himself rather, what he does with his victuals."—CARLYLE.

(THIS quotation is here printed to suggest the spirit of healthy irony in which alone the food question can be safely approached!)

Many readers will regard the present subject as the most important in the whole of hygiene. The food question, they think, goes really to the root of the matter. So it does, in some ways, Food and faith but many other matters are vastly more in need of attention to-day. The great attraction of the food question lies in the fact that it directs the mind within, and thus makes a direct appeal to a most unfortunate tendency which is, present in all of us. When the reader is told that he should keep his bedroom window open if he wants to be well, he may or may not assent, but in any case he is not excited or impressed. If he is told, however, loudly and long, that the real secret of long life is to live on fruit, or raw meat, or grapes, he may or may not assent, but his interest will certainly be aroused. He has never formally said, "Stomach, be thou my god," but, like the rest of us, he is so made as to find a fascination in the study of his own person, and the wisest advice regarding its health that directs his attention to something outside it will find fewer attentive hearers than the most ridiculous nonsense that turns the mental gaze within. This fact of the human constitution it is which explains the enormous success enjoyed in our own and in all days by the practice of consuming drugs and by food systems. There is really no useful distinction between these two. In one case you are told that you will be well if you swallow certain things, and in another that

you will be well if you swallow certain other things—whether the thing be pill, or cachet, or draught, or nut, or cereal preparation, matters not. The great thing is the use of some agent which directs the subconscious mind of the patient within, and makes suggestions of health. These suggestions cure in countless cases. The public, however, is an ass—present company always excepted—and never more so than in its interpretations of the phenomena displayed by its own person. One man is persuaded that he will be well if he lives on nothing but raw meat and hot water, and well he is. The same man in the same circumstances, had he taken the second turning to the left instead of the first, might have met another friend who would have told him that all would be well if only he confined his diet to grapes and nuts. Had he done so he might have been well. His faith may make him whole in either case. In all parts of the world, the Orient not excluded, there are thousands of drugs and diets, systems and creeds, cures of all kinds, involving the use of innumerable drugs of the most various and contradictory physical properties, and of dietetic tables which differ within the widest possible limits—they are all wrong, they are all right. They are simply means for the employment, directly or indirectly, of the all-prevailing power called suggestion, the potency and magnitude and ubiquitousness of which we are only now beginning slowly to realise. I believe that previous writers on the subject of diet have violently contradicted each other, and have brought the subject into its present state of unexampled bemuddlement, simply because in their study of this question they have totally ignored one half of the constitution of man, and that the better and the dominant half. When we have taken an article of food, have ascertained its percentage composition, its digestibility by the body ferments, and so forth, we have ascertained a series of

acts exactly comparable to those which are ascertained, let us say, the study of the relative value of various fuels for motor-cars. If man is simply a motor-car, there are no further inquiries to make; if he is anything more, we have merely settled a few preliminaries.

This is not to say anything so foolish as that these preliminaries are of no importance, or that faith will enable the body to utilise its carbon if it be administered in the form of diamonds or coal-dust, or its nitrogen if administered as laughing gas. On the contrary, man *is*, amongst other things, a kind of motor-car, and the question of his dietetic needs is in part a physico-chemical question, exactly comparable to that of the dietetic needs of a motor-car—faith or no faith. To certain of these questions we have absolutely positive and permanently established answers which are necessary deductions from the most assured results of chemistry and physics. I say this advisedly, notwithstanding what has already been said about the bemuddlement of contemporary dietetics, and the actual observations which show that most various and contradictory dietetic habits are one and all compatible with the most splendid health, energy, and longevity. Vastly though these various systems and habits contradict each other, there are certain requirements with which they all comply, and with which they all must comply. There is no system of diet which consists of nothing but beef-tea or clear soup, because these are not foods, and you would die if you attempted to live on them, however great your faith, however carefully you exploited the capacity for adaptation which all living things possess. Similarly no amount of faith or dietetic education will enable you to live on sugar alone, or starch, or sugar and salt and water, or even sugars, starches, fats, salts, and water. Whatever the circumstances, you would assuredly die of any or all of these diets within a few weeks.

simply because they do not contain one particular class of chemical compound which every animal organism, from the amœba up to man, must have if it is to live, and which is created by plants. Without proteids there could be no animal life. Let us, then, begin by noting the few simple and absolutely unchallengeable facts which are known, and then we shall be venturesome enough to wander in the maze of actual dietetic practice, and hope for some information on the journey.

Let the reader conceive of himself—the total man, mind and body—as and where he finds himself at this moment. He is limited, so far as his **The kinds of food** person is concerned, by his skin, and somewhere within this, as common-sense declares, though it is utter nonsense to philosophy, is himself. This total being, then, if it is to continue in being, must receive from without, whether continuously or at intervals, certain things which actually enter into it by one channel or another, and become part of it. The word food might properly be used to include the sum total of all these necessary things. So used, it would include oxygen from the air, which enters, or should enter, by the nose; light and other known and unknown ethereal radiations which enter the body by the skin, both where it is exposed, and in all probability also through the clothes, and by the eyes; and lastly, certain other substances, in no degree more real than oxygen and light, which commonly—though not necessarily—enter by the mouth, and which we call food.

From this point of view it is evident that air, in its relation to the body, is precisely on the same plane as the carbon, nitrogen, and so forth which, **Air as food** meeting the oxygen of the air in the body, are to combine with it, forming tissues and yielding energy. We have just as much right to say that the oxygen is burnt up with the carbon, as that the carbon

is burnt up with the oxygen. Neither is worth anything until it combines with the other. The mere fact that they enter by different channels gives neither a pre-eminence as a food over the other. Properly speaking, therefore, fresh air or oxygen is just as much a food as milk or meat; it is something that must enter the body from without, something that goes to make its tissue and to give it heat and energy. This continuously requisite food, oxygen, urgently demands the attention which is its due. *It involves the most neglected food question of the day.* At any dinner-table people will prattle about the food they are eating, recommending this, that, and the other, of none of which they know any more than of Sanscrit, whilst the food they are inhaling through their noses is laden with impurities about which they reck nothing, and against which the body is provided with far fewer means of protection than in the case of what we ordinarily understand by food.

My belief is that the principles of evolution bear directly upon this last question. For ages and ages it has been necessary for the body of man to adapt itself to any diet, to long periods of starvation, to foods that were nearly all waste material, to food-stuffs that were decomposed, that contained hosts of poisons: nearly every dietetic fad of the present day has been practised by our remote ancestors at one time or another, not from choice but necessity. Many and various adventures must primitive man have had when he set out from Asia to colonise the uncharted earth. Now a leading consequence of this is that man's digestive apparatus to-day, both in structure and in function, is capable in health—aye, and in disease—of dealing successfully with a diet more various, more abnormal, so to say, than that of any other creature. He can live—making blood and flesh and fat—upon milk and *pâté de foie gras*, high game, raw meat, twice-cooked meat,

fish, flesh, fowl, bananas, and red herring, horribly decomposed fish, such as many peoples think a delicacy leather, such as men on a lost boat will fight for oranges, oysters, grape-nuts, gooseberries, and I know not what. Within certain impassable limits, every thing is fish that comes to his net, and not least remarkable is his capacity for stomaching poisons—alcohol tobacco, all drugs whatsoever, all the poisonous substances in muscle extracts and in meat, and in decomposed food of every kind—with, on the whole, astonishing impunity. Our ancestors had to take what they could get. Those who could not stand decomposed food at a pinch died, and we are the children of the survivors who could. That is what natural selection means.

But as regards this question of air—as also regards let us say, the use of the eye for reading—the case is very different. Countless ages of selection and adaptation have not elapsed so far as these are concerned. It was necessary that man should be able to eat almost anything, but it was not necessary that he should be able to breathe almost anything. Stringent though the selection has been in so many directions, the conditions were, so to say, too easy so far as air is concerned. This, I believe, is why, though we unquestionably have some capacity for adaptation to bad atmospheric conditions, it is as nothing compared with our capacity for adaptation to diet. This is why our requirements in respect of oxygen are far more rigid and precise and uniform. This, I believe, is why, with all our marvellous capacities for defence and adaptation, we are hopelessly at the mercy of smoke in the atmosphere. We are descended from open-air animals, not only so far as our human ancestors are concerned, but in a line which extends to the time when life first left the water. Through all these ages there has been no selection by smoke—no survival of those who could

protect themselves against smoke—such as is going on to-day. This is why we are defenceless against it. Despite the nasal filter, we have no adequate apparatus for excluding particles of coal-dust from our air-passages and lungs, provided they be small and light enough. Our white blood-cells do their best and drag off a number of these particles to the lymph-glands near the root of the lung, but this is quite inefficient. Once a particle of carbon has got into the lung tissue itself, it never leaves the body until it is released by the worm. The lungs of an Esquimaux and of a new-born baby are pearly white (when the blood is removed from them), the lungs of a coal-miner are black, and the lungs of a Londoner or any city dweller in measure are a dirty grey. The muck comes in, there is no way of getting it out, and there it accumulates. Beyond a doubt the injury it effects is a most potent predisposing cause of consumption and other disorders of the respiratory system. If our ancestors for millions of years had lived in smoke, by this time, doubtless, there would have been evolved some system of filtration which, unlike that of the nose, would suffice for all particles, small as well as large. As it is, there is no help—until we come to our senses regarding smoke.

So much for a digression, the digressiveness of which the reader will rate highly according as his mind is bound by names and words. If, however, he has been at all convinced that the most urgent and widely-neglected aspect of the food question to-day is that of our gaseous food, as distinguished from solid and liquid food, then this digression will have been worth while.

As regards our ethereal food, the light and invisible ethereal rays which are absorbed by the skin and the eyes, no more need be said at present except simply that perhaps the question is **Light as food** one which will yet excite the deepest interest among physiologists. Light and radiant heat and all other

forms of radiant energy are just as real as the energy—and heat for that matter—which are produced inside the body from our food. Furthermore, energy as we know, is indestructible. The light, then, which enters the eye, the ultra-violet rays which enter the eye, all the ethereal waves which fall upon the skin and are absorbed by it, these do more than stimulate. To present physiology they are simply stimuli, and their effects are noticed; but they are also real, measurable entities, just as real as a bullet or a beefsteak and, like everything else, absolutely indestructible. If they enter the body, as they do, they are not only stimuli, but also food materials and foods. We know nothing whatever as to what proportion of our energy is thus absorbed nor as to the special forms into which radiant energy may be converted by the body. Nor do we know anything at all as to the question how far the exposure to light, the use of sun-baths, electric-light baths, and so forth, are really modes of feeding. Botanists, of course, know well that, in a word, plants feed on sunlight. All the energy of our own bodies, indeed, is transformed sunlight. It is commonly thought that this is all derived indirectly through our food from the plant, but since animals also are exposed to sunlight, and other ethereal radiations, some of which are certainly absorbed, and since no energy can be destroyed, it remains a question for inquiry what part this absorption plays in our food supply. Physiology hitherto has ignored this question.

And now, instead of commenting on what is commonly meant by the word food, I wish to introduce a more general inquiry, the relevance of which will be seen if we realise that man has succeeded in nourishing himself successfully for many ages, though the words "proteid," "carbohydrate," "nitrogen equilibrium," and so forth, signified nothing to him. In short, what, if anything, have

to guide us apart from physiological inquiry, and what have the lower animals to guide them?

The answer assumed by I know not how many theologians and moralists of the old school, and not a few ad-mongers and even serious students to-day, is—"Nothing." Experience or science alone must decide—what the adviser advocates as science. Since I believe that such assumptions are monstrously incorrect and wholly ridiculous, though not without a cause, it is necessary for us to consider, as briefly as may be, the function of appetite in general and the appetite for food in particular.

It is not well to assume, with thinkers of a school now happily obsolete, that whilst the structure of the body is the supreme proof of the power and prescience of the Deity, its functions, such as appetite, are interpolations of the devil. The possibility of abuse of the particular appetite without which the race would cease is no warrant for the argument that it is sinful, or even abnormal or undesirable. The hunger of an underfed but active child is no more to be entitled greed than is the air-hunger of a man who suffers from diabetes, or the thirst that follows exercise. These are latitudes, but they are constantly ignored. Take the instance of fever. In this condition the body needs water for many reasons: water is being too rapidly lost from the body; water relieves many of the distressing symptoms of fever; water tends to lower the temperature—being immeasurably safer and better for this purpose than the febrifuge drugs which doctors used to employ whilst withholding water; it dilutes the poisons that cause the fever, helps to dissolve them and carry them away. Thirst, or the appetite for water, is thus a normal, salutary, inevitable, and most beneficent symptom of fever. Only a few years ago, not merely did doctors regard the fever itself as dangerous—but instead of being the condition established by the body

in order to aid its defence—but they actually thought it was dangerous to relieve the thirst of fever, and so water was withheld. Such intelligence and imagination as the reader or I possess will not avail to elucidate the argument upon which this practice was based, but I fancy it was similar to that of the parent or theologian who regards a child's liking for sugar (a priceless food for children) as a sign of naughtiness, greed, desire to "gratify the senses," or, in a word, original sin. The doctor regarded the body of the fever patient as naughty; it was misbehaving itself, and must be appropriately punished. "I'll larn ye to be thirsty," he said.¹ The fact was ignored that the appropriate treatment for a wrong desire—assuming it to be wrong—is not to baulk it, but to remove it. Thus millions of persons have doubtless been killed by fevers which they could have conquered had the indications of nature been regarded as rational. This fear of water in fever is a sort of intellectual hydrophobia, which is still widespread amongst doctors and almost universal amongst the public. Until everyone regards it as a monstrous absurdity, it is *not* a platitude to suggest that appetite in general has a function, and that the creative or evolutionary forces, by whatever name they be called, are not in the habit of playing practical jokes—at any rate, on this scale. They could not afford to do so.

The penalty of believing half-truths is that it involves belief in half-lies, for if a thing be only half true it is half false. And this false conception of appetite arose out of the half-truth of historical asceticism, which it is the business of what I wish to call the new asceticism to amplify and correct. The general doctrine that we like what is not good for us—which is indeed much more lie than truth, but entombs a strangled truth—was an inference from the false as-

¹ Like the little boy who threw stones at a toad: "I'll larn ye to be a toad."

etic doctrine that the body is a rogue and a burden and a deceiver ever, and the true one that mind must be master. The new asceticism will not be so foolish as to deny that appetites of all kinds—even, I suppose, the appetite for high poetry or the symphonies of Beethoven, though I regret the admission—are capable of being indulged to excess. Much less will it question that appetites of all kinds, sensory, organic, material, and immaterial, are capable of perversion and vitiation. But it will avow that the perfectly healthy body—aye, and often the body in disease—is equipped with appetite as a guide and counsellor and friend and motor power; and even that *that body cannot be regarded as ideally healthy, the appetites of which are not trustworthy and beneficent*. The old asceticism said, “Stifle and deny your appetites”; the new asceticism says, “Train and rehabilitate your appetites”; that is the difference.

Now if the body displays any appetite that is liable to undergo perversion, it is the appetite for food, the existence of which is the simple answer to the question how in the world a tiger or a tapeworm manages to feed so well and efficiently, though it has never heard of calories, or Pettenkofer, or Prof. Chittenden, or Mr. Horace Fletcher. I have no doubt whatever that, if we did not make it part of our system with ourselves, and with our children from their earliest years, to deny, outrage, cozen, cheat, magnify, and vitiate the appetite for food by every means which silly ideas of morality, the artifices of cookery, and, in short, all the misapplications of the intellect can suggest, we should find in our appetites something to make the whole science of dietetics almost superfluous, and should rival the admirable and enviable state of such lower animals as have not been domesticated and corrupted by man, wherein the eater eats what he needs, when and as he needs it. What an ideal, and how incredibly remote

from human practice and the hopes of the most optimistic hygienist! And yet it is the common daily state of every vegetable organism on the earth and every animal except man, the paragon of animals, and those domesticated animals on whom his meddlesome, muddlesome intellect has practised its wiles.

The reader's appetite and mine at this moment—and here the old asceticism was practically right—are probably not to be trusted for a moment. We have *acquired* a host of tastes, for instance: I incline to think, on general evolutionary principles and on consideration of the kinds of things for which we acquire tastes—alcohol, tobacco, high game, condiments, and so on—that all acquired tastes (in physical matters) are *prima facie* bad, and not worth acquiring. If every normal human organism evinces at first a repugnance to tobacco or mustard or what not, I have sufficient faith in the forces that have framed us to believe that their verdict is probably correct. This requires the obvious qualification that the needs of an adult and a child are distinct; but even here we may note that the dislike of sweet things shown by many adults (who loved sweets when they were little) is certainly not a sign that the organism no longer needs sugar, that irreplaceable fuel, but is probably the consequence of essentially vicious changes in appetite produced by alcohol and tobacco. The father who accuses his child of greed or vicious appetite when it wants another sweet (for which he has no desire himself) requires to be told that the child's desire is an organic virtue and his lack of desire an organic vice. It is *he* that is the sinner.

This astonishing, if not quite immoral, doctrine—that appetite was given us as a guide to be followed, and not a lying tempter to be spurned—applies urgently to the everyday practice, I will guess, even of the reader who is deriding me for spending so much space upon

what everybody knows and sees for himself. Before the reader berates me for a platitudinarian and determines to throw me, metaphorically, into the waste-paper basket, and find some one who will "tell him what he does not know," I challenge him with his practice (1) *in hot weather*, (2) *when he has a feverish attack*, a cold in the head or what not, and his appetite fails. If, believing that he believes himself to be reasonably made, he follows the dictates of his appetite in these cases, he is a wise man, exemplifying the proverb that every man is a fool or a physician at forty; and as I can teach him nothing, let him by all means give these words away to the first fool he meets—the search will not fatigue him—and turn to something eternal: he can buy the Old Testament for a halfpenny, Wordsworth for a shilling or two, and Plato and Shakespeare for little more.

But, in point of fact, when the warm weather comes, the reader throws all his principles about the rational structure and functioning of the body overboard, or drowns them in iced water. He finds his appetite, usually so vigorous, failing. Something must be done; his "must-do-something" theory, as Herbert Spencer calls it, having been doubtless invented within the hour when the human intellect first discovered itself, and having been the source of abundant good and evil ever since. Amongst the evil is the preposterous drugging that has so long passed for rational therapeutics; and a lesser evil is the course pursued by most of us when the appetite fails. The reader, then, abuses his cook, is rude to his wife, snubs his children, even goes out to "get a decent dinner." Doubtless he can cheat his appetite somehow. But in warm weather we naturally need less food or fuel; and the man who will not follow the indications of his appetite is well on the way to over-eating, degeneration of heart and arteries, and premature senility—the beginnings of which are displayed by half the prosperous men of forty to-day—

twenty years too soon, if not sixty or a hundred, as Professor Metchnikoff would say.

Next we may take the case of the feverish attack. Here the failure of appetite is not the disease, nor is it one of the injurious consequences or symptoms which make a disease a disease; but it is a method adopted by the body in its fight with the cause of the fever. Yet you will endeavour to "force down" something; unaware that, in fever, the blood is so busy with more urgent matters that it cannot properly supply the special needs of the digestive organs, and therefore the stomach contains no hydrochloric acid—and indigestion is the result.

If I may modify a famous passage, *Nature never did betray the heart that trusted her*. If the reader does not trust her in such cases as these, it is not education for him to suggest that I should try to tell of appetite him something he does not know. His sort of knowing is not nearly knowing enough. Monstrously though we miseducate our appetites, they still remain of value, therefore, even though, at any moment, we may succeed in cheating them. They are not so easily or surely perverted as we might suppose; and they can, in general, be retaught with surprising success.

It was left to Herbert Spencer, in his wonderful little book on "Education," published in 1862, to discuss this subject in its relation to childhood. This question is most tempting and most important, and there are three or four pages in the chapter on "Physical Education" which should really be cited here, for their wisdom and insight and historical interest; but I have more respect for childhood than casually to add such a discussion to the present chapter. We may note merely that the practice of trusting to the appetite of a child is found to work, and that no superior method can ever be discovered. I have one case in mind where a boy of eight years has had what he pleased, as and when he pleased.

all his life, nothing he desired having been refused him except on one occasion when he wanted vinegar; and the result is as admirable as could possibly be. The diet of this fortunate boy is thus actually as perfect in its adaptation as that of any animal! But it will be evident that, if you habitually deny your child or yourself what Nature demands, you cannot reform your practice in an instant, else you will pay for the inevitable reaction. You have vitiated the appetite, and cannot trust it until its right action has been restored.

One more consideration is necessary—a brief enumeration of the factors which, though steadfastly ignored by practically all dogmatists about diet, **Variations** including even the most scientific writers, of appetite determine the numberless contradictions and individual variations that dispose of all such dogmas. These factors are as follows, I believe:—

(1) *Inherent variations in the bodily constitution and chemistry.*—Such variations render absolutely impossible the application to any given individual of any but the most elementary¹ dogmas regarding either quality or quantity of diet.

(2) *Acquired differences between one man and another.*—These may be due to *habit*. Feed a pig on proteids, and its pancreatic juice is found to contain mainly the proteid ferment; feed it on starches, and the juice contains mainly the starch ferment. Make a sudden change in either direction, and the result must be disastrous. This observation may be made in human beings any day anywhere.

Besides mere habit, *suggestion* is responsible for many acquired differences which dispose of the dogmatists. This has already been alluded to; but much more might be said. You taste a bad egg, and cannot eat the freshest of eggs for months afterwards. You have raw eggs during illness, and the same result ensues.

¹ "Elementary," not "superficial."

You are given endless blanc-mange or golden syrup in your childhood—and can never touch them in after years. This is or may be a really unfortunate incapacity, which you owe to your parents' carelessness and thoughtlessness, and which your children will in due course owe to yours. "Children should learn to take what is set before them," you say. Is this your rule with yourself? You do not even allow for a miscalculation. Your child asks for a second helping and stops after the first mouthful. After all, its appetite is human and can err. You compel the unfortunate to finish what it asked for. So much the worse for its appreciation of that dish when you are gone. How would you like to have some blundering, tyrannous giant, eighteen feet high, treat you so? What a rare and astonishing insight into the needs and misfortunes of childhood half a day of such a giant would afford you!

Sometimes the acquired peculiarity is inexplicable. Until I came across the record of a boy to whom egg was poison I much mistrusted the opinion of a friend that this was the case with him. Yet even if he did not know or guess that egg was in a dish it seriously upset him. He used to be fond of eggs. One day, halfway through a perfectly fresh egg, thoroughly enjoyed, he had to stop and retire; and egg, known or unknown, has been poison to him ever since. Some new series of chemical reactions has been acquired, and this is the result. This is a perfectly healthy and otherwise normal man. Yet if all were like him we should describe eggs in our text-books as we describe toad-stools. What becomes of our dogmas? "As full as an egg is of meat" is a truth for nearly every one, yet for a man here and there the truth would be, "As full as an egg is of poison." Here, no doubt, we have the action of the "sub-conscious mind," determining the unusual series of chemical reactions. Such, at any rate, is the explanation.

tion in cases where a bad egg began the mischief. The subordinate nervous centres *remember* the affront, and will have nothing to say to eggs in future, even though the conscious mind does not know they are there. Here suggestion, whether during hypnosis or otherwise, would doubtless correct the evil.

Any one who questions the relevance of suggestion to matters of diet has only to observe the facts afforded by the experience of any "born nurse." The patient cannot take this or that; such things "always upset me," he says. (His appetite is worse than useless, of course.) He comes under the charge of a born nurse, the right woman in the right place, if ever the phrase is applicable; she insists that certain things are necessary and must be got down; and what was poison yesterday is food to-day. These are matters of daily observation—but where is the text-book of dietetics in which their existence is even hinted at? Some years ago, when I began to write, I printed a series of articles on "Ideal Diets," following to the best of my ability the physiological teaching of the time; but if I should describe an "ideal diet" to-day, including not a few eggs, no doubt, and lauding their high nutritiousness, I should expect some one like my friend, to whom eggs are poison, to say, "There, you see, that is all these fellows know"; and he would be quite right.

Two practical illustrations may be cited regarding the proposition that appetite is not a will-o'-the-wisp but a true guide. There are two definite states of mind or body or both in which the failure of appetite normally endeavours to warn us against the danger of eating.

A man should not eat any but the lightest meal when he is fatigued. There is, of course, such a thing as normal fatigue, which is rapidly recovered from under the influence of rest; there is also the abnormal or noxious fatigue which too many of us know. There

does not exist, as a practical fact, fatigue due to the using up of the available food supply of the body. On paper, of course, we might become exhausted simply because the furnace needed replenishing. Actually we become exhausted long before any such point is reached. Now a characteristic symptom of undue fatigue is lack of appetite. If such fatigue were due to need of food, we should expect an increase of appetite to be a symptom of it, but it is exactly the reverse of this that we find. The truth is that the over-fatigued body, poisoned as it is by the by-products of work which have not yet been got rid of, is incapable of doing the further work, nervous and chemical, which we call digestion; and endeavours to protect itself against this further burden by a failure of appetite. A full meal taken in a state of marked fatigue is certain not to be utilized. It can be swallowed, but it cannot be digested. It is quite likely also to cause acute indigestion. Your business in such a state is to rest. When you have rested adequately your power of digestion will return, and your appetite with it.

Secondly, a man should not eat any but the very lightest meal when he is in a state of acute vexation or worry; if not, indeed, any acute emotional disturbance whatever. One of the results of emotion—it may be extreme fear or extreme joy—is to arrest the secretion of the digestive juices. We should learn from the hint afforded us by the fact that the mouth becomes dry as a symptom of fear. Along with extreme states of emotion there is therefore a protective failure of appetite, the significance and protective function of which we ought to recognise. We glibly talk about treating causes, not symptoms, and we should recognise the cause in this case. If your appetite fails, is lack of food the likely cause? Plainly not: the normal consequence of lack of food would be increased appetite. If lack of food, then, is not the cause of lack of appe-

te—and surely no more reasonable proposition was ever put on paper—the supply of food is not its remedy. In defiance of the natural indication we force ourselves to eat during such states of emotion, we shall suffer just the same consequences as when we force ourselves to eat during fever or during extreme fatigue. Is it not curious that sensible men, though knowing that lack of food cannot be the cause of lack of appetite, will persist in trying to treat the symptom by the supply of food? We need more respect for the common sense of the body.

It is probably safe to say that, for most readers, the question how to eat is more important than the question what to eat; and whatever we may think of “Fletcherism,” we are all indebted to its founder for his contributions to this subject. It is worth looking at carefully.

We have seen that one should not eat when fatigued or worried. It must be added in theory, however hopeless its application to practice, that we should not eat except when we are hungry. The skill of the cook so easily produces an artificial imitation of hunger, however, that this goes for little. We should certainly eat with zest and pleasure. This is not mere hedonism; on the contrary, we know that a pleasant frame of mind, and some degree of more or less conscious pleasure in the act of eating, conduce to the flow of the digestive juices. On the contrary, pain may completely arrest the action of the digestive glands. I do not believe in solitary meals as hygienic. Sane man is at all times a gregarious animal—even his immediate ancestors were gregarious or social—and eating should properly be a convivial act, as our use of that word suggests. It is partly the pleasure of the company, and not only the skill of the cook and the mixture of diet, that enables us to digest so well the ordinary modern dinner. The little delay between courses,

which at other times may cause annoyance and interfere with digestion, is beneficial if it is pleasantly occupied. Some, however, find this kind of function intolerable, but the remedy is not to eat alone—I speak for the moment of the bachelor. Personally one is willing to commend the company of a book, knowing at least one individual who has read at meals all his life, and has never had indigestion. The book gives you the company you require, allays annoyance between courses, and slows the speed of eating. It thus serves the same purpose as the fashionable dinner—with the difference that you can choose your company and change it if it is impossible. The mere mechanical speed of a meal is an important matter. There can be no question that it is well to eat slowly, and this is one of the chief objections to the solitary meal. Except for the gourmet the thing itself is not sufficiently interesting, and so we bolt our food. As we shall see, this is all wrong. Reading at his meals saves the solitary eater, and, by putting him in a comfortable frame of mind, promotes digestion. The “quick lunch,” which we eat perched on a stool in an atrocious atmosphere, glare, and noise, is quite indefensible. One has every sympathy with the man who likes to use all his time. But books are cheap to-day, and surely one must read sometimes. The excuse of saving time is thus not a really valid one.

Consider now the physical requirements of eating, it being assumed that other conditions are complied with. Nothing will here be said of the Fletcherite method, as I have not seen it practised, and might be proved wrong in suggesting that it sounds very funereal and as if it demanded as much attention as the analysis of statistics. I do not believe for a moment that we need turn over every morsel in our mouths, or that we need be more than intermittently conscious in a secondary way that we are eating at all. One can eat and write simultaneously, and enjoy both, and there is

something pitiable about the man who will not jump from his chair during a meal in order to settle a point or do anything else that strikes his fancy. Still, there is a definite physical necessity which should be complied with, whether we devote the entire soul to the exhaustive criticism and appreciation of every mouthful, or whether we leave that to an almost sub-conscious department. We certainly must masticate. This may be done of set purpose and on a plan—say, thirty-two bites per dose, giving each tooth a chance. Starvation sounds a welcome alternative to this. The right method, of course, is to have chosen one's parents carefully—much the most important matter for any of us—and to have been taught by them to eat slowly and chew thoroughly. The thing then becomes what we call a habit—a secondary or acquired automatism, to use technical language—which takes its due course on the application of the right stimulus, without our having to think about it at all. Such is the true use and function of habit, of which the present is as good an example as any. It is deliberately created by our higher part, which is then left free for its own higher purposes. There is something exquisitely ludicrous about the food faddist who does not know even how to eat. If, however, we do know how to eat, what we eat, within the limits of the ordinary menu, is for most of us a matter of secondary importance; and we have more time for living. Let us then see to this.

Every molecule of food that we absorb and live by enters the blood in the fluid state. To this there is no exception at all. Whatever we consume, **The use of** then, from the most ethereal fluid to ship's mastication biscuit, must, if it is to be of any use for purposes of nourishment, assume (or retain) the fluid form. This is not to say that there may not be some use in the consumption of substances which are irreducible to the fluid state, and never enter the blood at all, traversing

merely the digestive tube, which is, in a sense, outside the body. But so far as the food by which we live is concerned, all that is not fluid when taken, must be reduced to the fluid state somewhere between the lips and the absorbent surface of the small intestine. The stomach and bowel contain solvent juices, digestion being largely a process of liquefaction, and the stomach has considerable powers of churning, so that the food may be as completely as possible exposed to the action of these juices. But neither gullet nor stomach nor bowel is in any way comparable to the gizzard of the bird. No modern bird has teeth, remember. If our teeth, then, fail in their duty, which is significantly enough suggested by their position at the very place of entry, there is no apparatus which can replace them. The stomach will do its best. We know now that its digestive functions are probably not a whit more important than what was probably its original and primary function of guarding the bowel against the entry of any but semi-solid material; but the stomach has no teeth, and though its walls are muscular and active, they are thin and quite incapable of crushing anything. The more completely the ordinary diet is chewed, the more complete is its ultimate assimilation. The due use, then, of the teeth is a monetary economy, and a vital economy so far as the whole digestive apparatus is concerned.

Normally, the teeth should last our lives. When they do not we now replace them, and rightly. But civilised man is, so to say, an abnormal being in any case. It is probable that he would often do well to lose and not to replace his teeth—so misguided are his appetite and habits. Many a man digs his grave with his teeth, and many an elderly person who over-eats would live longer if he were deprived of his artificial teeth. It is impossible to agree with those extremists who declare that we should cease to use artificial teeth.

They might be logical, and demand that after a certain age we should have even our remaining teeth extracted; but it is right to insist that his artificial teeth often do the elderly man a great injury, simply because they permit him to abuse his appetite, artificially stimulated by the modern resources of food supply and cooking. If we were to follow the advice not to use artificial teeth, more harm than good would doubtless be done, for people would continue to eat abundantly notwithstanding, and so would incur all the evils of dyspepsia.

But the services of the mouth are not merely mechanical. We now know that powerful digestive juices are produced by the mouth, and that the food should be soaked with these before it is swallowed. Food like new bread, which suggests the consistence of putty, cannot absorb the saliva, and is therefore to be avoided. Food which is bolted suffers similarly. Food which has been properly treated in the mouth undergoes a special kind of digestion for some twenty minutes or half an hour in the stomach, during which time the normal stomach produces scarcely any juices of its own, but serves merely as a place of digestion. It is the mouth that has supplied the digestive agents. The argument, then, is certainly in favour of a somewhat dry food and the use of *little* fluid, at any rate at the beginning of a meal. The mouth should be left to supply its own fluids, which have their special action. One is not saying, of course, that any practicable objection can be taken to the use of soup at the beginning of dinner. We do not suffer, and no more need be said; but directly the digestion becomes impaired, from one reason or another, we find the benefit of compliance with the lines prescribed by the structure and behaviour of our digestive apparatus.

The third and last reason for mastication and slow eating is that it provides the condition for normally starting the interdependent sequence of events which

will not end until the food is absorbed from the bowel. Until within the last few years it was supposed that all secretion, including digestive secretion, depended upon stimulation by the nervous system. We are now learning that the body is organised into a whole not only by means of the nervous system, but also by means of chemical substances which are produced by one part of the body, and on passing to another part, cause it to pour forth its appropriate secretion, and so on. The relation of mouth and stomach is a case in point. The normal stimulus of the (acid) secretion of the stomach is food containing (alkaline) saliva. Similarly, the acid secretion of the stomach, passing into the bowel, calls forth the alkaline secretions of the bowel and the chief digestive gland of the body, the pancreas. In order to be perfectly carried out, this due sequence of events should be started by the production of an adequate supply of alkaline saliva in the mouth.

The due use of the teeth also promotes their own health directly; probably in the main by increasing the blood-supply to them, but also—especially if the food be at all fibrous—by cleaning them in the natural fashion, exemplified in the beautiful teeth of the dog, innocent of the tooth-brush.

The health of the teeth and use of the jaws prevent the gradual involution or atrophy of the lower part of the face, and preserve its appearance of strength and character. Doubtless this is rather a delusive criterion of character, but it influences us in our estimates of each other, rightly or wrongly.

Once the food is swallowed, it should be utterly and finally forgotten. If it has been reasonably chosen and Eating and chewed, we as conscious individuals have "after care" done our whole duty to it; the rest should be left to the body, and should not be imperilled by a single thought. Immediately after a meal sit in a chair and deliberately picture to yourself the move-

ments which are going on in your stomach, and speculate as to whether the chemical changes are going on rightly. At once you will feel definitely uneasy. This experiment should suffice for a warning. Your true food faddist may sometimes place himself in this plight, as too often does the dyspeptic. No measure of conscious attention to digestion can be anything but injurious. From the completion of the act of swallowing, or before it, we should think no more about the subject: we can effect nothing but harm by doing so. This is one of the many reasons why one deplors the attention paid to matters of diet to-day. Attention to matters which commonly proceed without our attention never pays. The latest, highest, and most characteristic part of man (which, so to say, resides somewhere in the higher areas of his brain) was not evolved for purposes of introspection of any kind, but for looking outwards, if not upwards.

As to whether one should exercise or go to sleep immediately after a meal, there is nothing of any moment to say. The cricketer is none the worse for turning out and playing through the afternoon immediately after a good lunch. Many animals sleep after meals, and the nearer one is or returns to the animal, the more likely are we to do the same—for instance, the child¹ and the glutton. If one has an adequate supply of blood, it can be in more than one place at once, fortunately. If it be defective, the digestive demand for it may leave the brain inadequately supplied, so that we tend to sleep. Thus there are many reasons, and some of them perfectly good ones, why people of very various ages and habits tend to sleep after meals. But a man should be hardly pleased to observe any such tendency in himself.

¹ Not that the normal child is a glutton, but that for different reasons, both child and glutton happen to be, for once, classed together, as nearer to the animal.

THE USE OF MEAT

THE "simple straightforward" questions to which ignorant people return positive answers cannot be positively answered here, the writer's knowledge being insufficient; but it is possible to state certain known facts regarding the use of flesh as food which will help us in time to close correctly the long vegetarian controversy.

The word vegetarianism, as commonly used, is an utterly foolish one. The food which makes and is made by cows—that is to say, milk—is surely not a vegetable; nor yet are those very young chickens which we call eggs. But where is the human vegetarian who takes neither eggs nor milk? Wherever he is, he most probably has one foot in the grave, or might as well have both. Avoiding, then, these deceptive and useless phrases, let us first note a few of the common opinions which are mere foolishness in the eyes of science.

There is no warrant whatever for the belief that because what we call meat is muscle tissue, it therefore has a special service for muscular strength. The colour test and others The vegetarian hippopotamus has nothing to learn from Sandow. It was similarly thought that blood must be the best food for persons suffering from anæmia, but this is conspicuously untrue, since blood is extremely indigestible even by the healthy, let alone the anæmic stomach. There is also an extraordinary superstition to the effect that since blood is red, red substances in general may be counted upon to make blood. For many generations red wines, of all shades, have enjoyed a special reputation in this connection. This has no basis whatever in fact. The red colouring matter of the wine is totally different from the hæmoglobin of the blood, and actually has no food value of any kind, whether for the blood or for any other tissue. In the case of red meat, the superstition

is no less absurd. The colouring matter of such meat is not hæmoglobin; if it were hæmoglobin it would require to be broken up for purposes of digestion; and further, if it were hæmoglobin, it would be utterly destroyed by the process of cooking. The substance which gives its colour to what we call butcher meat is quite its least important constituent.

This touching faith and interest in redness, however, which is perhaps the sign of an artistic tendency ludicrously misdirected, has long afforded and still affords great opportunities to certain kinds of doctors, qualified quacks, or else mere repeaters of what they hear. Highly successful practitioners exist, especially in the great capitals and in health resorts, whose depth and rarity of knowledge is expressed in their choice of wines for their patients: "Ah, no, my dear lady, white wines should not have been prescribed for you. It is my experience that in such cases as yours, where the digestion is so delicate, only the most carefully chosen red wine is of value. I am so glad you consulted me on this point." All this is quackery. Nothing is known as to the relative values of red and white wines, and very little indeed as to the relative use of different kinds of alcoholic liquors. The doctor who professes to a knowledge of the uses of tint and bouquet and "characteristic ethers" and so forth in this or that wine or spirit, has no exact experience to refer to, no experiments in the laboratory, and no statistics. The only truth in what he says is that he is glad of the patient's visit. He would have been gladder still of the fee without the visit. Members of the medical profession are not allowed to say this sort of thing. If they prefer not to go gagged, they must refrain from practice, as the present writer does.

It would not be fair to say that this kind of humbug, which is really only a subtle form of theft, can be detected in the prescribing of meat of this or that

colour. Here it is merely a case of accepting traditional belief without inquiry, and as every human being does this at some time or other, we cannot afford to throw stones. Nevertheless, it is the case that practically nothing is known, and certainly nothing at all of any practical importance, regarding the relative values of meats of various kinds, except in so far as one may be more or less fat than another. And the doctor who differentiates between beef and mutton, between white meat and red meat, between one kind of game and another, has absolutely no scientific evidence in his support. Doubtless different muscles have fibres of different size and length, and this affects their digestibility, but the colour test of food and drink in general is pure nonsense.

The humanitarian objection to meat-eating cannot be entered into here. Apart from this, we find two great parties, violently opposed, and, as usual in such cases, we may find the truth between them. On the one hand, there is what we may call the roast beef of old England Roast beef party, who think that the Empire is built and empire upon beef. Remembering the saying attributed to Napoleon, "Ah, those English mothers," I should rather be inclined to assert that empires are built upon milk, if any food at all is to be regarded as their foundation. And after milk, wheat certainly. This belief in meat, under which term we may include all kinds of muscle used as food, whether the muscle of mammals or birds or fish, is highly popular; not for a moment because public opinion has investigated the scientific evidence for it and found it valid, but simply because meat is a tasty food. It is the fact that the flavouring matters in meat, and especially in butcher meat, have a very marked effect upon the nerves of taste. The brown substance formed on the outside of a "roast" is one of the most intense of all known stimulants of this sense. Furthermore, the experiments of

Pawlow show that the flavouring matters of meat call forth the gastric juices more efficiently than any other substance that can be swallowed. The popularity and reputation of meat thus depend really upon the fact that this food is grateful to the senses and to the stomach. The evidence as to its physiological utility is quite another story.

But the facts just noted are certainly very good arguments, so far as they go, in favour of the view that muscular tissue is probably a natural food for man. The mere fact that its flavouring matters stimulate so pre-eminently the nerves of the mouth and nose and stomach offers very strong presumption in favour of the view that the human body has been adapted by long ages of evolution to this diet, in part at any rate. We shall have to note the paradoxical fact that not one of the substances which give meat its attractiveness to the senses is of the smallest food value, and that the actually nutritive constituent of muscular tissue, whether "flesh, fish, or fowl," is a white, tasteless, odourless substance, no more attractive to the senses than white of egg, of which it may be described, rather loosely, as a variety. Muscle undoubtedly contains some useful salts, and we know that vegetarian animals, unlike carnivorous animals, require to obtain salt from other sources than their ordinary food. But the chief and essential food constituent of all muscular tissue whatever is simply its albumen or proteid, and all the forms of this great food staple are, in their pure state, as insipid, odourless, and free from colour as the typical albumen which we find, liquid or solid, in the white of a raw or a cooked egg. Everything which really tempts us to eat meat has the whole of its functions described in that phrase—apart from its stimulation of the gastric secretion, it is of no more value in itself than the jam in which a powder is concealed, and plays precisely the same part.

This fact throws an interesting light upon the extraordinary delusion and practice of extracting from Beef muscle all these "extractives," throwing extract away the food, and declaring this extract to contain the "essence" of the meat. These beef extracts are absolutely destitute of food value, as has been proved by chemical analysis and by physiological experiment, not once but a thousand times.¹ They are tasty, however, and we are cheated by them, as we always are by anything that flatters our senses.

In the papers of the very morning on which I write, I see a blazing advertisement of a meat extract, headed "for children who dislike meat." The first sentence runs as follows: "Many mothers experience considerable trouble with their children owing to their dislike for meat, a fancy which as a rule only time will eradicate, persuasion being almost useless." Children are not under discussion in the present work, but what has already been said in general on the function of appetite will suggest to the wise reader of this advertisement the truth—that there is probably very good reason for the child's dislike of meat, which should be most carefully respected and regarded. The second sentence is as follows: "Meat is such an essential part of a child's diet that if it be omitted on account of a little idiosyncrasy of the childish palate, a serious loss of strength and vitality is likely to occur." The comment on this is that meat is in no sense an essential part of a child's diet; that probably the less meat it has the better; that the so-called idiosyncrasy is a wise provision of the child's body; and that, from the omission of meat, a serious loss of strength and vitality is the last thing that is likely to occur. Of the next sentence we must approve without qualification. It is sound physiology and sound psychology, and cannot be too widely

¹ Animals fed on beef extract die of starvation as quickly as animals not fed at all.

believed—"On the other hand, food taken by a child under compulsion is seldom properly assimilated, and is little likely to be of any benefit."

We are then informed that "medical experience, however, has found an easy way out of the difficulty. Doctors are now ordering . . . to be added to the little one's milk and bread and milk. Only a tiny quantity should be used—one-eighth to one-quarter of a teaspoonful to half a pint of milk. The results thus obtained are very satisfactory, for not only does the child absorb all the meat that is necessary for its proper sustenance," &c. This is very true, for from this beef extract the child absorbs no meat whatever, and that is all that is necessary for its proper sustenance. I note, in passing, that this is only one of fifty cases, from one point of view amusing enough, in which proprietary preparations that are of no value at all are recommended to be taken with milk. The milk does the good, and A, B, or C gets the credit.

I recommend as specially relevant to the firm responsible for this advertisement the remark of Baron Liebig himself: "Meat extract cannot make us strong, but it makes us aware of our strength." It is a stimulant and a condiment, and nothing more; but a child should have no need of either—nor indeed should any one. If we had a modicum of sense we should learn from Nature in this respect. With all her variety, she produces one substance, and only one, which is designed as a food, and that is milk. This contains no condiments, no flavouring matter, and no stimulants. It is the only perfect food, incomparably the best food that exists for young or old, in health or in disease. To add highly flavoured material to the food of a child, or of an adult, is directly to deny this plain and consistent indication of nature.

Speaking of beef extracts, our leading authority on diet says, "Being neither tissue-builders nor energy-

producers, they cannot be regarded as foods." This is not to say that in the case of adults, who are our special study here, these extractives of meat may not have some little value—usually abused—as accessories of diet, though they are in all cases superfluous in health. They are simply condiments, and in general condiments should be avoided. Nearly every member of the well-to-do classes eats too much, and condiments are simply a means of cheating his appetite to that end. In the attempt to be absolutely fair, I have formerly stated that beef extract may be useful in that it persuades us to drink hot water, but in all probability the thirst it creates is merely proportioned to the need for diluting and aiding the excretion of the poisons of which it consists, so that I doubt whether this result is worth attaining. I have also stated that since meat extract is the most powerful known stimulant of the secretion of the stomach, and a great appetiser, there is some sense in beginning a dinner with a clear soup, which is simply a meat extract. But since I wrote this, the work of Fletcher and Chittenden and many others has proved that, in general, our dinners are far too large, and that the last thing we need is an artificial aid to appetite.

These remarks may have some little effect, but the commercial interests which they tend to injure are of no small power, and I have long given up supposing that to publish the truth about alcohol, or meat extract, or the food value of cocoa, is forthwith to dispose of the current superstitions, carefully nurtured and fostered as these are from day to day by interested persons.

It must really be granted without reserve to the vegetarian party—or, rather, the anti-flesh-food party—that, quite apart from any humanitarian or ethical considerations, the consistent trend of dietetic and physiological inquiry for several years past has been

in their favour. Probably they take a half truth for a whole truth, but it is certainly a half truth at any rate that meat is not in any way a necessary item of human diet, and that very many of us eat far too much of it. It is a delusion, now proved to be such, that meat is necessary for the man who does hard physical work. As for intellectual work, I have formerly quoted the case of Herbert Spencer, who tried vegetarianism for several months, had to give it up, and even had to destroy all he had written during the vegetarian period, because it was so lacking in energy! I do not doubt that this was true for him: it is quite natural that the absence of the accustomed stimulant substances found in muscular tissue should have such an effect. But it is only fair to observe that Mr. Bernard Shaw, whose intellectual output is certainly not lacking in energy, eats no flesh-food. If he suddenly took to it, I daresay he might suffer in certain ways, just as Herbert Spencer, abandoning it, did in others; but his case shows that flesh-food is no more necessary for intellectual than it is for physical work.

At the time of writing, perhaps the latest contribution to this subject is to be found in a series of papers published in the *Proceedings of the Royal Society of Edinburgh* for 1907, and embodying the results of work done in the physiological laboratory of the University of that city. They are concerned with the action of a meat diet upon the rat, in respect of various functions, such as the development of the skeleton, fertility, and the performance of lactation. This last is of special interest, since it may possibly bear, I think, upon that incapacity to nurse their children which is a most lamentable and apparently increasing fact regarding the mothers of the most prosperous classes in civilised societies. One of these papers appears to prove quite conclusively that the progeny of meat-fed rats are

usually poorly developed, and show a high mortality in early life, and that the bones of the young rats whose parents were meat-fed, and who, after birth, were themselves meat-fed, offer lamentable contrast to the "control rats," which were fed on an "exclusively bread and-skim-milk diet." The observations were made on no less than a hundred meat-fed rats. It may be said that the whole bony system of such rats is diseased—the skull, ribs, spine, long bones, and all. The evidence of the disease is extremely definite, being both microscopic and macroscopic.

The next paper compares the consequences of the opposed methods of feeding on fertility and lactation, and the result is immensely favourable to those rats which were fed on bread and milk, as compared with those which were fed on an exclusive ox-flesh diet. A third paper, dealing with an allied subject, is equally definite in its conclusions. It may be here suggested that *possibly* these studies have a bearing upon the low birth-rate characteristic of the most prosperous class of society, by whom so much meat is consumed.

One of the workers referred to, Dr. Chalmers Watson, has since done some work which has already been referred to, and may be recalled here, though it does not deal directly with the eating of meat. Himself a Scotsman, belonging to the race which excels in the average physical size of its members—or used so to excel—he has studied, also in the rat, the value of porridge, which has until lately been the Scotsman's characteristic food. It has been lately shown, for Edinburgh, that nowadays porridge is largely being replaced by other foods in the diet of the poorer classes, and we can scarcely fail to wonder whether this fact is related to the appalling physical state of Edinburgh children lately revealed.

The research in question opens up an almost unexplored field—the effect of food, not merely as food in the ordinary sense, but as a stimulant and helper of

the development of various glands of the body, the right activity of which is necessary to its health. Perhaps the most important of these is the thyroid gland, which is situated in the neck, just below the voice-box, and defective development of which is known to be responsible for a well-marked form of idiocy; whilst defect of its function in later life causes an equally well-marked disease. Now, when the thyroid gland is studied under the naked eye and the microscope, in large numbers of animals which differ from one another, so far as the fairest selection can make out, only in this respect, that the one set had porridge and the others had not, there is found to be a constant and quite unmistakable difference in the thyroid glands of the two sets of animals. The gland of the porridge-fed animal is not merely large, but under the microscope its cells show every sign which tells the physiologist that they are in a state of vigorous secretory activity. The contrast with the case of meat-fed animals is extremely conspicuous. It is, perhaps, too soon yet to say that porridge has been conclusively proved to have a specific stimulant effect upon what is, perhaps, the most important of all glands for the proper development of the body, but the facts look very like it.

The reader may be inclined to think, especially if he be a vegetarian already, or predisposed in favour of vegetarianism on account of its humanity as compared with the killing of animals for their flesh, that such researches as those just quoted surely settle the matter. But, unfortunately for all of us—and not least for a writer, since the public prefers dogmatic and decided opinions—the matter is not yet settled. We must look at some facts in favour of meat before anything like a summing-up is attempted.

The familiar argument of the uric-acid school against meat may be easily dismissed. The argument is that an excess of the undesirable substance called uric acid is

present in the body in gout and various other disorders, and that since (as is asserted) this uric acid must plainly be derived from the foods, such as meat, which are known to be the sources of it, all such foods should be avoided. As I have pointed out again and again, and as has been lately observed by Dr. Hale White,¹ there is no warrant for the assertion that the characteristic uric acid of gout is a product of the food at all. It is, indeed, the product of morbid changes in the tissues of the body, and there is no kind of proof that to withhold the foods which normally break down into uric acid is to correct the morbid chemistry of the living tissues. The whole argument is founded in a staring fallacy. Further, the class of foods that produce uric acid are, in any case, absolutely essential for life—not necessarily in the quantities often taken, nor necessarily in the form of meat, of course, but necessarily in some degree and in some form or other. A further point, which I have taken occasion to allude to before, is that the experience of all the carnivorous animals disposes of this argument. The tiger surely shows few enough signs of gout or uric-acid-æmia, so-called, yet his diet is such as to yield this acid in large quantities. In truth the symptoms of gout and its allies are not really due to uric acid at all.

Professor Richet, of Paris, seems to have shown, in the case of the dog, that meat (taken raw, of course) may be a most valuable food. Consumptive dogs retain their appetite in spite of the disease, and frequently recover when they are fed exclusively on raw meat. On the other hand, though healthy dogs can thrive on cooked meat alone, consumptive dogs so fed rapidly lose ground. The question of the cooking of meat will be discussed in a moment.

¹ In his "Plea for Accuracy of Thought in Medicine," an address delivered to the British Medical Association in 190

Meanwhile it may be provisionally stated as our conclusion that the recent study of meat, whilst disproving the notion that it is essential for the highest muscular or mental vigour, does not prove that the adult would be better without it altogether. That a mixed diet is best for man remains perhaps the only certain fact of dietetics so far as the choice of foods is concerned. But most prosperous people tend to eat too much, and meat offers special temptations in this respect, owing to its flavour and its effect, already noted, upon the digestive juices. Further, it offers great opportunities to the cook, who is valued in proportion as he or she can succeed in cheating the appetite. At any rate, probably once a day is quite often enough to eat meat.

Meat is cooked for æsthetic reasons, by force of custom, and in order to soften and loosen the connective tissue between the muscle fibres. The process makes it more digestible so far as the action on the connective tissue is concerned, but less digestible so far as the nutritive muscle tissue itself is concerned. Undoubtedly, then, the best way in which to eat meat The cooking must be that well recognised as the best of meat for the invalid, viz., raw, but well chopped up or actually grated. The tiger does not need this aid, for he has good teeth and the sense to use them, whilst most of us have neither. Short of this proceeding, it is at any rate much better to cook only lightly such meat as we do consume. Meat is less digestible roasted than boiled. All forms of meat, without exception, are costly. In this respect—as in respect of alcohol—it is probable that prosperity is not necessarily an unmixed boon. We have noticed the replacement of porridge by meat to a large extent in Scotland, and the most recent statistics, collected by the Board of Agriculture, suggest that in England there is now consumed twice as much meat per head as there was twenty years ago. The proportion of meat to bread has risen so much because

of increased prosperity. It is one thing to have money and another to spend it wisely.

Muscular tissue is essentially the same whether it be red or white, derived from mammal or fish or bird. The advantages of fish as against meat are worth noting. Having less flavour, it is less likely to cheat the appetite. It is relatively cheap. The variations in price have *no relation* to food value; we pay simply for flavour. Reckoning by food value, the herring is the cheapest and best of all fish-foods. Fish do not contain an exceptional amount of phosphorus, popular opinion notwithstanding. The most easily digested fish are those which contain least fat—cod, whiting, and haddock.

The disadvantages of a total exclusion of muscular tissue from the diet—*i.e.*, the disadvantages of what is usually understood by vegetarianism—are that more strain than they were probably designed to bear is thrown upon the digestive organs; vegetable food is more difficult to digest, and less stimulant to the digestive juices. In most of its forms it is much bulkier than animal food. We may compare the size of the abdomen of, say, a greyhound, with that of a cow. The vegetarian almost inevitably tends to have a large abdomen, since his diet is relatively so bulky. He has to pay more in digestive energy and in house-room, so to say, but less in money.

The familiar truth is worth repeating that, in the last resort, all animals without exception live upon vegetables, which alone are capable of living upon sunlight and inorganic matter. In the absence of scientific developments hitherto far below the horizon, this is a fact which the true patriot or statesman can never forget, vegetable life being thus a source of real wealth for any nation. The question for us here is the extent to which mankind may use the vegetable world directly as a source of food, the

alternative being to use it indirectly by consuming animal products, such as meat, milk, and eggs—which are one and all transmuted grass.

The chemical study of vegetable foods warrants the proposition that, to say the least, man should not be a pure carnivore. If the choice were necessary between a vegetable diet and a diet of muscle, we should very soon discover by trial that the former demanded our suffrage, if for no other reason than that the various classes of food constituents, proteids, fats, and carbohydrates (sugar and starch) are far better represented in the vegetable world than they are in muscular tissue. If, indeed, we were confined to the animal world alone, pure carnivorousness would be found to fail. Only by the use of milk could we succeed.

On the whole, vegetable food is less easily digested than animal food. The digestive apparatus of a herbivorous animal is much more complicated and effective than that of a carnivore, and the herbivore requires to spend more of its time in eating. We have the advantage over the ox that we can cook our vegetable food, this process markedly increasing its digestibility; whereas, on the whole, it diminishes the digestibility of animal food. In a sense this is rather unfortunate, because it is animal food that more commonly conveys disease, in the form of microbes, which cooking kills. In the study of the great vegetable staple, bread and its allies, we have seen that, apart from the question of cooking, human intelligence has already done a great deal to enhance the value of vegetable food, and will do much more. It is very far from necessary that even the thorough-going vegetarian should spend anything like as much time in eating as do the lower herbivores.

It is possible to confine the issue between vegetable and animal food to a single point. So far as fat is concerned, there appears to be little to choose between them

The diges-
tion of vege-
table food

except that vegetable fat is very much cheaper. So far as the carbohydrates, starch and sugar, are concerned, Vegetable vegetable food has the verdict without any proteid question. It is only as regards the proteids that any substantial argument in favour of flesh as against vegetable food can be adduced. And here chemical analysis pronounces in favour of flesh. Even wheat, or pea-flour, is far inferior to even the fattest meat, not to say lean meat, on the score of proteid. The question, then, really comes to be, how much proteid do we require, it being granted that some quantity, at any rate, of this kind of diet is necessary for life. The older school of dietetics stated a proteid figure which substantially involved a verdict against vegetarianism, but the newer school, with which the name of Professor Chittenden is associated, and to whose views we must return, threatens so radically to modify the older view that the customary argument against vegetarianism can no longer be confidently put forth. Thus the trend against meat, already referred to, receives support on general dietetic grounds quite apart from any question as to the relative merits of animal and vegetable, but simply because the higher proportion of proteid in meat is now suggested to be a burden rather than an advantage.

Thus it is impossible to dogmatise, as one would probably have done ten years ago, and as we shall perhaps be able to do with greater accuracy ten years hence. If the reader is annoyed that his author cannot say definitely what is best, I can only say I am very sorry, and that he will find plenty of partisans to lay down the briefest and clearest propositions—about which nothing is uncertain except their precise relation to truth. Meanwhile, one may quote a very significant and valuable admission from the revised edition (1906) of Dr. Hutchison's work on "Food," to which, as an unrivalled repertory of facts, every writer on dietetics

s indebted. The vegetarian party may well be pleased at these words of an author who has a very decided leaning towards the old school, both as regards proteid and alcohol:—

“The danger, indeed, is all the other way, in the direction of a too liberal consumption of meat. It is for insisting upon the disadvantages of such a course, and on the feasibility of living upon a diet from which meat is altogether excluded, that we in this country owe even the extremist vegetarian a considerable debt of gratitude; and if the above objections to living upon a minimum of proteid can be shown to be groundless, as the experiments of Chittenden have already done something to prove, then the objections to a purely vegetarian diet largely disappear also.”

THE NEW SCHOOL OF DIETETICS

THE disastrous consequences of an inadequate diet are too familiar and too obviously necessary to need any insistence. But it is only latterly that we have begun to realise how important are the consequences of an excessive diet. Doubtless in any individual case they are less important than a defective supply of food would be; this latter undoubtedly predisposes to tuberculosis, and probably to the attacks of many other infectious diseases. So much cannot be alleged against over-feeding. But it is now proved up to the hilt—and every day makes it clearer—that over-feeding is also disastrous; and it is probably safe to surmise that for at least ninety-five readers out of a hundred, arguments on this score have the personal importance which would not attach to a dissertation on the palpable dangers of insufficient food.

The real pioneer in this matter was a brave and independent thinker whose name is sometimes apt to be forgotten nowadays, but who is still alive and hale in his nineties, and whose little book, **The work of Keith** "A Plea for a Simpler Life," first published in 1895, is as well worth reading to-day as ever it was. In this rightly celebrated protest Dr. George Keith boldly laid down certain propositions diametrically opposed to general belief within and without the medical profession. What he there said against drugs is now echoed by every one who knows the facts and finds himself free to speak, and his argument against high living, based as it was in his case upon clinical observation and upon common sense, and dating from about 1860, is now based upon the experience of thousands of persons and upon years of the most critical observation and experiment upon the human subject.

We have emerged into the dawn of science to-day but until lately medical opinion has undergone the mos

absurd changes, having just the value and just the same causation as the fashions in feminine head-gear. In the 'thirties of last century most of the common disorders were ascribed to excess of some kind or other, and treated accordingly. "Depletion was the order of the day." Then, in the late 'forties, a London doctor started the opposite fashion. Nothing, of course, was then known about heredity or the conditions under which living races change, and the medical profession, still two generations behind the biologists in its notions of heredity, explained its change of front by declaring that the human body had undergone a profound change, so that it was "less able to bear lowering measures than formerly."

Dr. Keith tells us how he early lost faith in the medical dogmas of the 'forties, but how rudely some of his hopes were disappointed. He thought that that absurdity called homœopathy would involve the decadence of drugging. Such good results were obtained when drugs were given in infinitesimal doses that, as he saw, they were palpably due to the practical withdrawal of all drugs whatsoever and to greater attention to simpler methods. The profession, however, was too much occupied in fighting heterodoxy—which it loathes as no profession or institution, and very few individuals, have ever loathed falsehood—to see the real meaning of the success of the homœopaths. Now, after some seventy years, is Dr. Keith's triumph.

The "starving doctor," as he was so long called, saw the truth about drugs, about over-feeding, and about alcohol, decades before most of us were born, and long before the dawn of the scientific study of any of the three. He saw the meaning of loss of appetite in fever, and the meaning of the desire for water, at a time when every drop of water was withheld from the feverish patient, and when the medical profession defied the indications of appetite in health and in disease even

more grossly than the public did and does. He saw the value of hot water when no one else did; and these words of his, summing up some sixty years of experience on the part of a man who really could learn from experience, are worth quoting now. Of course they are platitudes, just as most of Herbert Spencer's sayings are platitudes now, but in each case time was when the platitudinarian was one against the world:—

“To sum up: the doubtful remedies which, according to the new axiom,¹ are as a rule to be avoided in states of disease are medicines of all kinds, alcoholic stimulants, and food; and nature's methods, which we advise to be substituted for them, or rather to be allowed full play without them, are rest, not forgetting rest to the stomach; warmth, or in rare cases, cold; a free supply, usually of water, and always of fresh air; and sufficient time for the organs to recover their ordinary working powers, and especially for the nervous system to make up its wasted energy. In short, we must fall back on the old and much forgotten *vis medicatrix naturæ*.

“I have heard of old men who never had taken medicine, nor consulted a doctor, and who, if they felt unwell, at once stopped all food; if this was not enough they went to bed, and remained there till they were better. The first rule I have followed for forty years, the last for fifteen, since I have been able to do so, and it has very rarely been necessary; and I do not intend to do anything more in the future. My friends can see the difference in my health, and I feel it.”

The reader must permit me to insist upon the extraordinary insight of this great medical philosopher, one of the few in any age. Remembering, for instance a recent lecture by Sir Frederick Treves, and the opinions which every wise clinician now expresses, let us

¹“Better no medicine than a doubtful one,” which Dr. Keith proposes to substitute for the extraordinary aphorism of Hippocrates, “Better a doubtful remedy than none.”

consider these words of Dr. Keith's, which show that he was a pioneer in the true conception of disease, as in so many other directions:—

“Diseases, as we are called to treat them, or, in other words, the abnormal phenomena presented to us by the sick, are not the essential elements of the case, but are signs of processes set up in the body in order to relieve itself of some disturbing influence, threatening to interfere with its functions, or (it may be) to destroy them altogether.”

As we read on and compare Dr. Keith's arguments with the facts of clinical experience, and especially of modern pathology, we are almost inclined to question whether, despite so much medical practice even to-day, a patient ever dies of inanition, as such; that is to say, of lack of food materials. It is more than doubtful. Even in cases so described, everything seems to show that the real cause of death is not inanition but poisoning, the poison being sometimes introduced as such from without, but more often manufactured within.

Is the reader aware that bleeding, once the universal medical practice, then absolutely abandoned, is coming at last into a rational and intelligent vogue, as, for instance, in such a disease as pneumonia—in exact justification of the arguments so long maintained by Dr. Keith?

But we are concerned here especially with the question of diet, and the last chapter of Dr. Keith's little treatise¹ must be regarded as the real starting-point of the modern view. He shows that over-eating must be evil, and declares, as we now know he was well justified in declaring, that “no doubt there are very few healthy people who can afford it, who do not usually exceed.” As regards meat, he quotes a case which every modern

¹ The reader who seriously cares for hygiene should possess a copy of this masterpiece (thirty-five cents, Mitchell Kennerley).

physiologist would now understand. "Perhaps the most white-faced family I ever saw was one of six, in South America, who had at least two full meals daily of beef and mutton. The only exception was the baby, which was still at the breast, and which was a fine rosy child." This suggests the dictum which one is, I think, warranted in printing—that red meat turns one white, and white milk turns one red. But almost everything that we are now coming to see is to be found in this wonderful little book. Thus, on being consulted by men in apparent good health, but who complained of being "out of sorts," Dr. Keith, as he tells us, "advised them to take their food more slowly, and assured them that they would find that less would satisfy them; and this, if carried out, will often enable a man to reduce his food by one-half, and will add very much to his comfort and health." He reminds us of the effect of high living upon the racial instinct, too familiar for us to insist upon here, and the observation that high living is fatal to accurate shooting—this again in exact parallel with the modern work on alcohol; and just at the end he provides us with a very forcible argument from the practice of Sir Isaac Newton, Napoleon, and the Duke of Wellington—to whom Mr. Edison, it seems, may be added—"who, when engaged in working out some great problem in science or war, took actually no food until the strain was over." Too little and not too much space has been devoted to the work of a great master of medicine and of hygiene, the veritable introducer of sanity into modern medical thought. One may merely add that, should the reader be annoyed because, in all this talk about food, I have included no fixed rules in matters of detail, in this respect I am only following the pioneer himself, who deplores strict rules, and calls his long experience to witness in favour of this opinion.

The name of an American gentleman, Mr. Horace Fletcher, must here be named and honoured. This is

not to commit us to all his views, but to recognise that he is a real pioneer. The greater part of the principles which have been laid down in preceding pages, and which are to be associated with the names of Herbert Spencer and Dr. Keith, are also accredited by Mr. Fletcher. But to him we owe the particular service of bringing the matter before the tribunal of exact science. The late Sir Michael Foster, one of the greatest of modern physiologists, had his attention brought to the matter in 1901, and was very deeply impressed by the observations of Mr. Fletcher and those who were helping him. Experiments performed at Cambridge succeeded in arousing the interest of scientific men in America, and especially of Professor Chittenden of Yale, who is now the leading scientific protagonist of the new doctrine in dietetics, which he has called "economic nutrition." At the time of writing, controversy on this matter rages high. Many distinguished students in this country, such as Dr. Robert Hutchison and Sir James Crichton-Browne, are very far from accepting Chittenden's results. To attempt to decide the controversy now would be simply preposterous. So much the worse, of course, for the writer, since nothing pleases the public better than thoroughgoing dogmatism. Nevertheless, one is compelled merely to present the principles of the new dietetics as fairly as possible, and to show that at the very least we have here a doctrine which must be taken seriously. It may be wholly true or only partly true, but it is definitely past the stage when it can be ignored, or the second stage commonly encountered by a new doctrine, when it is ridiculed. At the moment, as we might expect, Chittenden's work has made greater headway in America than elsewhere. The number of its adherents in England is not insignificant, however; in Germany, on the other hand—though the popular trend is undoubtedly away from meat—the recognised

physiologists are still quite content to retain the older views of a generation ago as to beef and beer and an abundance of proteid food. On the other hand, at a recent International Congress on Hygiene in Berlin, the question of the amount of proteid we daily need—and that is the leading question at issue—was discussed, and the opinions in favour of a low proteid diet, as against the older view, were very decidedly in the ascendant. One speaker, for instance, insisted upon the possibility of violent athletic exercise on a very low proteid diet, and another said that he “had been able to keep his family in health on food which cost him about three-halfpence a head per diem, for years; on this diet his wife could ride her bicycle from eighty to a hundred kilometres.” None of these assertions is advanced as conclusive. Merely I wish to show the reader that the unprejudiced observer is now bound, beyond a doubt, to listen to Fletcher and Chittenden freely and with respect.

It was one of the basal propositions of physical science which led the present writer, as a medical student, to pigeon-hole the views of Dr. Keith in his mind many years before scientific experiment was forthcoming in their support. The indestructibility of matter. The physicists teach a doctrine of the conservation of matter, and though the discovery of radio-activity and the modern electrical theories of matter have caused this dogma to be abandoned as an ultimate truth, yet practically and proximately it has to be reckoned with. No atom or molecule of food or anything else that we consume is annihilated. It must either remain in the body permanently or it must leave the body. The inevitable conclusion is that if it is not stored, it is worse than useless. Either it must lie in the body somewhere, as foreign matter which cannot be beneficial or else it must be disposed of, and this disposal must necessarily involve vital cost. These propositions are

necessarily true, whatever be the details of the fate of superfluous food. If, in addition, we find that the surplus forms definite poisons, then the matter becomes still more important than it would be if there were merely a waste of vital energy to consider.

We have, then, first of all, to find out by experiment how little food the body will actually thrive upon, and secondly, what happens to the surplus. Especially must we ascertain whether the surplus—as most people incline to believe—can be stored up against a day of need, or whether this is impossible. To be brief, the new theory asserts that the food requirement is a mere fraction of what used to be believed, that the surplus can be stored up against a day of need only to a small extent, and not at all in the case of the most important food, which is proteid; and that the business of disposing of the surplus is a serious one, involving labour on the part of many vital organs, and in the long run nothing less than chronic food-poisoning, for which we pay in the form of degeneration of the blood-vessels, kidneys, and other organs—these degenerations being hitherto quite unexplained by pathology, which has commonly, but without an iota of evidence, put them down as senile.

Now before we go any further, it is well to recognise as an absolutely cardinal truth the doctrine that something must happen to everything that enters our mouths. In health we know no more of the matter than that from the moment of swallowing there is nothing more to know. That, of course, is well, but the law of the conservation of matter remains. For the present purpose, we cannot do better than regard the body as the engine of a motor-car. It is this, though it is more; and the standpoint of the present book, which tries to insist that man is more than a machine, would be reactionary and useless if we were not to recognise that the body is a physico-chemical machine, even though we shall never explain the whole of the human being in

these terms. Now no one who knows anything of any engine will question that something must happen to everything that is put into it, and that if more is put into it than it can use, some injury must result. If we consider this in the light of what we know of pathology, and especially in the light of the fashion in which our bodies degenerate many decades before they should, on analogy with other living creatures, and especially if we realise how utterly the current pathology fails to explain these degenerations, we may begin to suspect that something like an epoch is being established by the new students of dietetics.

There is an exceedingly forcible argument for the new view which is based upon the machine analogy—The machine if indeed analogy be not much too weak a theory word. The essential constituent of the living machine is proteid. The work which it does is combustion in the main, and for this purpose it needs fuel. These fuels will burn outside the body as they do within it. An inorganic machine could be run on the combustion of sugar, just as the body can. The first food need, then, is for fuel, and the fuel foods are the fats and the carbohydrates, starch and sugar. But the body, unlike all inorganic machines, itself undergoes ceaseless flux. From moment to moment it is being broken down and remade. For its maintenance the animal body, unlike the vegetable body, requires continuous supplies of its characteristic constituent, proteid. Ideally, then, we should consume just so much proteid as is necessary for tissue-maintenance; whilst all our energy should be obtained from the mere fuel foods. Such a diet would be most economical from the monetary point of view, but, as we shall see—and this is far more important—it would be most economical from the vital point of view.

For observe that proteids also can be burnt. Suppose, then, that the supply of pure fuel is deficient, the

necessary energy must and will be obtained by the combustion of proteid, the least objection to which is that proteid food is dear. Or it may be—and this is the rule with nearly all of us—that the proteid intake is very much in excess of the requirements of tissue-maintenance, and therefore that—although the supply of pure fuel may be abundant—there must be a combustion of proteid, not for any good that is to be got out of it, but simply in order to get rid of it. The normal body does not excrete proteid as such. There is nothing to be done but to burn it up.

The question then is, what happens when proteid is burnt in the body, whether because in the absence of pure fuel it must be burnt, or whether because it is taken in excess? Here modern physiological chemistry has its say. It teaches us that the pure fuel is wholly burnt. In the case of fats, there are carbon and hydrogen to burn; in the case of starch and sugar there is carbon to burn. Two simple substances, then, are the products of this combustion—carbonic acid and water. That is the whole story. The carbonic acid is disposed of by the lungs with the utmost ease, and by a process which seems to be purely mechanical and costless of life, depending, as it seems to do, automatically upon the proportion of pressure of carbonic acid in the blood and in the inspired air. As for the water, it is disposed of by lungs, skin, and kidneys, without any appreciable labour; it is not a poison, but it is the solvent and diluent of poisons, and carries them away with it. Nothing could well be more perfect and complete than these processes as they normally occur in every living organism, the body of man included.

But now let us consider the fate of proteid in the body—or, rather, of all proteid beyond that proportion, whatever it be, which is necessary for tissue-maintenance. The case is utterly different. Fat and sugar are not simple chemical bodies, but, compared with

the simplest proteid, they are as simple as water. The bodily combustion of proteids is, at the very best, a most imperfect process. If it were perfect, the products should be carbonic acid and water, whilst the nitrogen which is characteristic of all proteid might just remain as free nitrogen, which is neutral and harmless. Nothing of the kind happens. Perhaps we may be able to name a dozen of the products of proteid combustion in the body. For all we know, there may yet be hundreds awaiting discovery. We are now beginning to guess what they do.

All these are theoretical considerations, and the reader may find them dull. If, however, he is interested in machinery, and will consider the case of imperfect combustion in the instances he knows, even this physiological theory may be pardoned. The present point is simply that the student who has never practised Fletcherism; never met a Fletcherite, never spared a thought for his own diet, and who even deplors the amount of attention which the food question obtains at the present day, is bound by a knowledge of the elements of physiology to approach these new views with very considerable favour.

But the proof of the pudding is in the eating; the proof of gravitation is in the discovery of Neptune; the proof of Listerism in the healing of the wounded. In other words, wonderful though of low the human mind be, it must test every proteid diet theory by experiment. In the case before us, if we are to believe the varied, repeated, critical, and comprehensive testimony of the last seven years, it seems impossible to deny that theory is warranted by practice. Of course, the experience of one individual, or two or ten, does not necessarily mean anything, just for the reason that man is more than a motor-car, and that, on the whole, faith is more than food. We had to listen with respect to the case of Mr. Fletcher himself:

very interesting and significant—but significant of *what*, we could not yet say; and so with the other early enthusiasts. The influence of suggestion and emulation, and of the mind over the body, or, if you prefer, the trophic influence of the nervous system upon every tissue or organ—this had to be reckoned with.

But the case is now different. For single persons we now have scores, for believers in science, or for personal friends of Mr. Fletcher, we now have utterly unbiassed persons—soldiers, students, and so on. Then again, there was the factor of time. We heard of good results, but how long would they last? Here again, we are compelled—it seems impossible to deny—to admit a favourable verdict. Even a carnivore, such as the dog, thrives on a low proteid diet, and goes on thriving, and even gains in weight. As for man, he seems to benefit in every way; the elderly cease to grow “old,” the athlete becomes stronger, fitter, quicker; the student studies better. Such, at any rate, are the results which are laid before us, and which, as it seems to me, we cannot but accept.

Of course, in science the true answer to experiment is experiment. Protests and criticisms are all very well, and may or may not be useful according to their character, but those who uphold the older views in any subject must meet the newcomer sooner or later by appeal to the only authority, which is Nature. When a clinical observer makes experiment with alcohol in pneumonia, critically comparing the results in a large number of cases, treated with and without the drug, and finds that, according to his results, the use of alcohol in this disease kills a large percentage of patients, he may or may not be right, but the only rational method of answering him is to repeat his experiment and to obtain different results. In this particular case several years have passed, and the champions of alcohol have done nothing except what the contem-

poraries of Galileo did—appeal to Aristotle. Similarly in this case. The old school go on appealing to Aristotle, but this is merely tiresome. If they are to refute Professor Chittenden, they must repeat his experiments, and obtain different results. Hitherto, the new views on dietetics, like the new views on alcohol, remain utterly unchallenged by experiment, and we shall very soon, if not now, be entitled to say that the case of the gentlemen who do not desire to be proved wrong is going against them by default.

The idea of self-poisoning or auto-intoxication, then, must henceforth be reckoned with in the study of **Self-poisoning** dietetics. As a matter of fact, experiment with various constituents of diet suggests that a great deal of what is commonly called auto-intoxication is no such thing, but the consequence of actually poisonous elements in the food. Apart from these, however, there is the auto-intoxication dependent upon the production by the body of poisons obtained from the decomposition of food excess, and especially of the proteid surplus. This is not the time or the place to discuss the precise figures of Professor Chittenden, though he has for some time past asserted that two ounces of proteid per diem represent the daily need of a man of average size. But it is well that we should learn the importance which modern pathology attaches to the idea of auto-intoxication, and that we should recognise this as one of the consequences of taking an excess of proteid—which practically means eating too much meat. What exactly constitutes excess is a point which we need not be too hasty in deciding. On this matter of intoxication dependent upon what we eat, the greatest living authority is undoubtedly Professor Metchnikoff. The impartial observer need attach very little importance to the remarks made at the end of chapter iv. of Professor Metchnikoff's last book "The Prolongation of Life." It is perfectly plain that

Metchnikoff and Chittenden are making for the same goal, and that their work is complementary. Metchnikoff has a particular view of his own as to the best method of avoiding auto-intoxication, and so is naturally inclined to criticise Mr. Fletcher's panacea of slow eating. I believe that there is a great deal of truth in the opinions of both workers. As to the description of "bradyfagy," a "disease due to eating too slowly," it is in any case the last disease that most of us need fear, and the invention of words is at least as easy as the discovery of truths. Any one who remembers his Greek can discover fifty new diseases in an afternoon. At the same time there is force in Metchnikoff's arguments from comparative physiology, and it is difficult to dissuade oneself of the idea that the extreme mastication prescribed by Mr. Fletcher is scarcely natural.

These are details. The point is that food-poisoning, or poisoning by the products of food, must now be recognised, however it is to be avoided. It is the recognition of this that to my mind marks, rather than anything else, the new school of dietetics. The American observers may lay greatest stress upon the excess of food, as such; Metchnikoff, on the other hand, may insist mainly upon microbic products formed in the bowel. For us the difference matters little, but the experience of the Fletcherites strongly suggests that the microbic processes which Metchnikoff fears cannot be more effectively and completely abolished than by the Fletcherite *régime*. I am not acquainted with any evidence provided by the followers of Metchnikoff to show that their systematic employment of lactic acid works any better in practice than the American method, if indeed, it works anything like so well.

For us at the present stage it is sufficient to realise that various and independent schools of contemporary workers, approaching the matter from wholly different

standpoints and with wholly different presuppositions, are making it more certain every day that nine-tenths of what we call old age, senile changes, premature senility, tissue degeneration, and so forth, are due not to time, but to toxins, have nothing whatever to do with old age as such, but are the results of chronic poisoning—which by one means or two or many will be avoided in the future. This is the really important aspect of the food question to-day. The faddists may fight as long as they please over the relative merits of this particular article of diet as against that—it matters little: but if it should be proved, as it is now quite evidently being proved, that, qualitative details apart, the quantity of food consumed by all but the poor is highly excessive; that this excess, whether as such or whether under the action of microbes, involves the continuous exposure of the body to poisons; that, as Metchnikoff declares, a man should be old not at seventy, but at a hundred and twenty; that if we were wiser we should live to play cricket with our great-grandchildren; that it is possible to gather decades of experience without growing old; that life may be active, happy, and profitable to self and others in the eighties as in the twenties—then, plainly, the food question is worth discussing after all.

THE CARE OF THE BOWEL

THE question of the care of the bowel follows directly upon that of food. It is true that a small section of the community appear on their own showing to have solved this question altogether. These are the Fletcherites, who have reduced the waste matter of their diet to an almost infinitesimal quantity, which they call the "digestion ash," and who require to dispose of it perhaps only once in a fortnight. The possibility of this, however, depends entirely upon the adoption of a very circumscribed dietary scheme, and we may here ignore it.

The majority of any civilised community find it difficult to meet the requirements of health in this respect. The selection of diet and the mode of its preparation, eliminating as it does the ^{The} neglected greater part of the "ballast," works hand ^{bowel} in hand with the sedentary life (involving the abdominal muscles, internal and external, in a lack of tone), together with the mere rush of existence, towards the production of constipation as by far the commonest of all minor maladies. Indirect testimony to this is furnished by analysis of patent medicines. Occasional revelations show the almost incredible extent to which they are consumed, and if we classed the whole of them as aperients we should really be not far from the truth. Most of them simply consist of aloes, the familiar aperient, disguised in one or another form. These are the constituents of the most popular pills, syrups, and so forth. These drugs cannot be condemned without qualification. Of course they are monstrously expensive; also their use in many cases must favour the production of hæmorrhoids; but large sections of the community undoubtedly find them valuable simply because they relieve the constipation from which so many people suffer.

A mere overloading of the bowel, as such, would probably be of small moment. It is not constipation, but what it involves, that is injurious. Microbes appear to enter the body of the infant about the tenth or eleventh day, and thereafter they are never absent—except, perhaps, from the bowel of the Fletcherite. It may possibly be that, as Professor Metchnikoff maintains, the characteristic microbe of milk is beneficent because it controls the growth of others. But, with this exception, the intestinal flora, as it is elegantly styled by bacteriologists, is unquestionably injurious unless it is kept under control. Apart from the incidence of such maladies as appendicitis—which is, curiously enough, commonest in the least constipated class of the community, viz. young men—the microbes of the bowel in the course of their life do us injury by the production of a host of chemical compounds which necessarily enter the blood, as examination of the urine, for instance, will immediately prove. The constipated person, then, is subject to a chronic poisoning by products which are usually described as of his own manufacture—though, as we see, this is scarcely accurate. The conception of what is called auto-intoxication is an undoubtedly true and valuable one, explaining as it does many of the so-called phenomena of senility, and doubtless leading, on the whole, to a vast abbreviation of human life. Scrupulous care of the bowel is undoubtedly one of the means by which it may be reduced or avoided.

It should be known to elderly people that a finger can be laid on the cause of certain of their troubles—“Vague feelings of organic bodily discomfort . . . which interfere with the full enjoyment of life, and which mean that the processes of nutrition, and the working of the great internal organs connected with digestion, are not done as well as before, and no longer give conscious satisfaction. This feeling is often con-

nected with a newly developed constipation of the bowels, and with the diminished keenness of the appetite of food." As Dr. Clouston, from whom the quotation is made, points out, the symptoms are due to an auto-intoxication which demands a considerable modification of the diet at this time of life. This modification should take the form of reduction, and it is particularly necessary to control the constipation to which he refers.

Doctors commonly lay down the rule of "once a day" for an adult. Let no ignorant person in charge of a young baby imagine that this will suffice. The matter for it. But for the adult it constitutes a of frequency good enough standard. There are hosts of exceptions to it which are consonant with perfect health, and it is well that this should be recognised. Every other day may be the rule with some people, and I have in my mind a case of a person in perfect health whose bowel has regularly moved twice a day for many years. That the question of diet largely determines the need of the individual is proved by the Fletcherites, who thrive under conditions which would suggest the immediate need of an abdominal operation in other people. Still the rule of once a day is a good one, and those in whom the frequency can be lessened consonantly with perfect health are the exceptions.

Modern students of hypnotic suggestion have proved up to the hilt the extent to which the action of the bowel is under the control of the nervous system. In suggestible subjects they are able as a matter of course to cure the most obstinate constipation by instruction of the sub-consciousness, as we call it, quite apart from any regulation of diet, or the use of any drugs. They can inform the patient that the bowel will make a demand at a given hour, and so it does. There can be no question at all that the formation of what is really a nervous habit is the proper means of dealing with constipation.

It is vastly superior to the use of any drugs, and is of course applicable in cases where the use of an irritating and bulky diet would only upset the digestion. Such a sound habit can be formed quite independently of hypnotic suggestion. Dr. Schofield, our foremost authority on functional nerve disease, has told us how it is possible to establish a habit that will last throughout life. A definite hour is to be selected; "the bowels are henceforth to be opened at that hour, and at no other. Whatever the inclination to go before, it is to be resisted. Five minutes before the appointed time, the patient is to be solemnly got out of bed, robed in dressing-gown, and taken to the closet, whatever her feelings. . . . The hour is not to pass without the bowels being opened." If necessary, an enema must be given. Dr. Schofield continues:—

"After some weeks a natural desire will be felt at the exact time, and from this time only steady perseverance is required to form the fixed habit for life. I could adduce numberless cases at all ages, from early childhood to a lady seventy-four years of age, whose rectum was so inactive that a trained nurse was kept in the house solely to evacuate it artificially, and who yet established a perfect habit in six weeks. Of course no day must be missed, and the hour never varied. I think on the whole I have earned more gratitude from patients by forming this habit in bad cases of simple constipation than in any other way."

It is open to any reader to train himself in this fashion, definitely understanding, from the first, that success is certain even in the most extreme cases of purely nervous constipation. Certain rules may be suggested. The hour, of course, should be after breakfast. Various movements associated with getting up have begun to wake the bowel. Much stimulation is afforded to it from within by the breakfast. In many men the after-breakfast pipe is also of assistance. These cir-

cumstances combine to make this the best hour. It must be rigidly adhered to, inclination or no inclination. The further point is that sufficient time must be allowed. This is very frequently overlooked, especially as the business man has little time to spare at this hour of the day. The nervous apparatus may decline to be hurried, and its action may be inhibited by the consciousness of hurry. If a fixed hour is adopted and adhered to, and if a sufficient time is always allowed, the necessary nervous habit can be formed by any one.

The formation of this habit is a real boon. Many forms of headache, indigestion, lack of appetite, mental and physical fatigue, bad temper, together with various aches and pains—commonly described as rheumatic or the like—can be avoided by the avoidance of constipation. Indeed, if the reader desires to ascertain the number and variety of the disorders for which constipation is largely responsible, he need only turn to the advertisement of any popular pill. We laugh, of course, at the claims of these patent medicines, but any drug which relieves constipation may make most, at any rate, of these various claims with some show of warrant. The maladies which it professes to cure are one and all symptoms—various though they appear—of a single condition which the drug attacks; and if one is not going to meet constipation in any other way, it is certainly better to swallow these various pills than to suffer from its consequences. In this sense they are worth many guineas a box, even though any chemist would be prepared to dispense exactly the same thing at 2d. a box, and make a handsome profit on that. Aloes is cheap, and so is sugar.

One more word regarding drugs. It must be clearly laid down that the drug is not known which in any proper sense of the word cures chronic constipation. Every medical student is warned against imagining that

this is possible. The drugs used by the manufacturers of patent medicines have this particular virtue for their vendors, that they insure the perpetuation of the need for them. As I have said, it is better to use them than to be constipated, but it is vastly better not to use them. There is a real parallel between their employment and that of most hypnotics; and in both cases the common sequel will be a necessity to increase the dose. Further, aloes and similar drugs markedly relax the venous circulation in the lower bowel, and though hæmorrhoids are doubtless less injurious to the health than chronic constipation, they are a burden not lightly to be borne. The formation of habits of regularity and punctuality is at least as effective as any drug, is vastly cheaper, and is free from all disadvantages. It is a mark of the folly which attends our so-called national education, that these elementary truths of personal hygiene should be quite unknown to the great majority of the community. *To educate the bowel is really to educate the lower brain, which is the only educational route to the higher brain.* Things less true and new than this have been said, perhaps.

Superior people constantly blame the lower classes for their consumption of patent medicines. They should blame themselves in so far as they are responsible for the methods of education which alone permit the enormous sale of these compounds. It is suggested that the composition of patent medicines should always be printed upon them. This is doubtless good, so far as it goes, but it is not the real remedy, which is the inclusion of personal hygiene and the formation of habits of health as not merely an item in the education of every one, but as obviously and inevitably the first and most important item. The reader may be referred to Herbert Spencer's remarks on this subject made nearly fifty years ago.

Though all other considerations are subsidiary to the formation of the nervous habit, yet a word or two may profitably be said as to diet. Whole-meal Constipation porridge is to be commended, and oatcakes and diet and brown bread: it being assumed that the digestion will accommodate these things. Both children and adults should consume the crust of bread and toast. Syrup, treacle, and marmalade are useful at breakfast; fresh vegetables are always valuable, partly as furnishing "ballast," and partly on account of the aperient salts which they contain. It is scarcely possible to eat too much fruit. Every one should eat some fruit every day. It is valuable for the bowel and no less valuable for the blood. Fresh fruit is the best, but stewed figs and prunes are very useful, and if one cannot obtain fresh fruit, jam, at least, should be taken. Often constipation can be much relieved by increasing the consumption of fluid, especially between meals. Milk is somewhat constipative, and buttermilk may sometimes be substituted. It is highly nutrient, and may have other virtues as well. Nothing can be more stupid than the too common custom of taking aperient medicines every day, whilst consuming large quantities of improperly made tea, containing an abundance of that highly astringent substance, tannic acid. (As the exact English of astringent is "binding," the word is not so technical as it appears.)

In the chapter on Exercise, reference has been made to the importance of keeping the abdominal muscles in proper tone. This is most important, and if the cult of muscle is to be justified at all, it is on the ground that at least it opposes constipation.

If the constipated reader will take seriously what is said in this chapter, especially as to the avoidance of drugs and the formation of a sound nervous habit, he will certainly find that the reading of this simple little book has given him a new lease of life and happiness.

THE SKIN AND ITS APPENDAGES

So far as personal attention is concerned, the bowel is the most important organ of excretion, and after it we may rate the skin, but a word or two must be said regarding the kidneys, and this by way of warning. They are best not thought about. In the more or less hypothetical man who lives a rational life, these wonderful organs will do their work without any care or attention, and will remain undegenerate until the close of life. Alcohol, syphilis, and lead may poison them, but Bright's disease has nothing whatever to do with pain in the back, and need not be feared by those who avoid the definite agents of renal degeneration. Of course, volumes might be written upon the pathology of Bright's disease, but I wish merely to warn the reader against believing all that he hears about it. Let him be also warned against taking note of the colour of the renal secretion. Unless, indeed, from the purely æsthetic point of view, this is not worth doing. More varieties of yellow, no doubt, will thus be revealed to the artistic eye than in any other quarter, except, perhaps, a sunset, but their physiological significance is nugatory or non-existent. If a man's skin has been very active, so that much water has been lost by that channel, of course the pigments of the renal secretion will be less diluted, and so it will appear high-coloured. It is not worth while to consult a doctor on the meaning of this remarkable phenomenon.

The other great organ of excretion is the skin. It is, however, the excretion of water and not of other matters that it mainly effects. Thus a varnished person will survive. On an average, however, we dispose of about 25 ounces of water each day by means of the skin, and this function is to be promoted, since the free and rapid circulation of water through the body probably makes as such for vigour and life, even apart

from the fact that water is a solvent in some degree of almost all waste products, and so helps in their removal.

Something has been said in a previous chapter as to the relations between the skin and the body heat. It is mainly by the evaporation of the water of the sweat that the skin regulates the body temperature. The dissolved solids are left upon the skin, and the chief use of washing is to remove them. The reaction of fresh perspiration is acid, but the microbes which are present in even the cleanliest skin effect a change which makes the reaction alkaline, and gives the solids of stale perspiration their unpleasant odour. The extent of this odour marks the average cleanliness of a crowd. The densest Japanese crowd, for instance, is said to have no odour at all. In the study of the effects of bad ventilation, it seems uncertain how far they should be attributed to the inhalation of the gases arising from an ill-groomed skin. Judging by the habits of our ancestors and of the most abundant classes in the community to-day, it seems more than likely that we can exaggerate the ill-effects of lack of cleanliness, and doubtless these would be even less than they are if we were more scrupulous about the rule that clothing should be absorbent, and that by being worn loose it should interfere as little as possible with the ventilation of the skin.

No student of physiology can question for a moment that, important though external washing be, internal washing is vastly more so. As a Sussex Washing
from within
and from
without gardener, innocent of bathing, remarked, "I be quite clean: my sweat cleans me." Very many of us would doubtless be better for drinking more fluids of an innocent kind between meals. This makes for the essential cleanliness, which is a cleanliness not of skin but of tissues. Leaving the body through the kidneys, the skin, and the lungs,

the water, in so far as it leaves by the two former channels (which convey between them about seven-eighths of all the water that leaves the body), carries away with it in solution a multitude of effete products. This necessity for internal washing is often overlooked and ignored by those who are most scrupulous as to the cleanliness of the skin, which is, after all, of greater importance from the æsthetic than from the hygienic point of view. They "make clean the outside of the cup and the platter, but within they are full of extortion and excess." It would perhaps be too much to quote further, and say that they "are like unto whitened sepulchres, which indeed appear beautiful outward, but are within full of . . . all uncleanness." Yet certainly the exhortation is for them, "Cleanse first that which is within the cup and platter, that the outside of them may be clean also." The quotation applies in full measure to those who neglect the hygiene of the bowel, which they do allow to become filled with all uncleanness and excess, to the injury of the whole body; though one-thousandth part of its contents found upon their skin—from which it cannot be absorbed—would cause them the utmost disgust and concern.

Herein we find further commendation for exercise as promoting the activity of the skin, and thus the process of washing from within. It is probably good for every one that, during some part at any rate of every day, he should undergo sufficient active exertion to induce free perspiration.

Herein also lies the value of those forms of bath, such as the Turkish bath, which promote perspiration. In cases where other organs of excretion, such as the kidney, are defective in their action, the skin thus exercised may go not a small way towards making good the deficiency. I wish to insist that the passage of water through the skin in this fashion is a thousand-fold more cleansing in the proper sense of the word than

the mere application of water to it from without.

In the interests of physical asceticism, the cold bath might doubtless be commended for those to whom it is trying, but not on other grounds. After The cold all, the cold bath is a most inefficient bath cleanser, and any virtues that it has are not the obvious virtues of washing. It is apt to become a fetish. I have known elderly people who persisted in the cold bath, without misgiving, though for hours afterwards their extremities were chilly, if not indeed blue. If such persons can be dissuaded from the practice, they benefit greatly. In the case of the cold bath, whether indoors or out-of-doors, there is one simple criterion of its value, and that is the occurrence of the healthy reaction indicated by the after-glow of the skin. If this does not occur, one has lost and not gained. It has to be remembered that during every moment we pass in cold water, heat is being lost from the body. This, as such, is nothing but loss. It is warrantable only if it involves stimulation of the nervous system, the good effects of which will persist for hours afterwards. In general, it may be said that the value of a cold bath is in inverse proportion to its length. If the half-minute dip is found beneficial, ten minutes will be by no means twenty times as beneficial, but may be very injurious indeed.

For purposes of cleansing, which largely means the removal of fatty matter from the surface, warm water is required, and if one has to choose between The warm going to bed with the day's dirt and remov- bath ing it in the morning, or, on the other hand, going to bed clean, it is obvious that we can state in a word the ideal practice as regards bathing. It is that the warm bath be taken at night, and a cold dip in the morning. Thus one obtains the stimulation when it is wanted, and cleansing, together with the soporific effect of a warm bath, when these are wanted. One need hardly point out that the warmth has the further value

of inducing perspiration, largely dependent upon the flooding of the skin with blood, which involves a relative anæmia of the brain conducive to sleep.

It is probably a bad practice to use extremely hot water for bathing.

The surgeon has long ago abandoned the sponge. Growing in sea-water, this is a beautiful and admirably adapted animal, but for purposes of cleansing its corpse has its defects. If we are to be particular, we shall abolish it from the bathroom, as it has long been abolished from the surgical theatre. Various substitutes are familiar to all. They should be rough, cheap, and frequently replaced.

As regards special kinds of baths, the value of suggestion must be insisted upon, as also that of the daily *regimen* commonly associated with their use. There is no absorption by the skin either of the water or of the dissolved solids of the bath. In so far as they have any action at all, it must be through stimulation of the nerves of the skin, and this is quite inappreciable. It is evident that if a man who has been over-eating, taking no exercise, living in stale air and artificial light, drinking too little water and too much alcohol, suddenly adopts a rational mode of life, he will profit. He would profit similarly whether he happened to bathe or not, whether at a Continental Spa or in a London suburb.

A word or two may be said as to the creation of facial beauty. The popular methods are, of course, **Beauty of skin** beneath our contempt, it being here assumed that the brain or the mind is the man. The skin, however, is necessarily affected by the movement of the subjacent muscles of the face, and this movement largely depends upon emotion. In the long run, therefore, if the emotions have been beautiful, the face will become beautiful, and *vice versâ*. This is the rational basis of physiognomy, and the interested

reader will find every warrant for it in Darwin's great work on the expression of the emotions. For the rest, any discussion of the injurious results of cosmetics may be deferred to a subsequent volume devoted to the interests of the sex which, as we know, used cosmetics in Knossos four thousand years ago, and has been using them ever since. It may fairly be noted, however, that many soaps are really unsuitable for the skin of the face, and that the presence of free alkali in a soap, though undoubtedly increasing its cleansing power, makes it injurious to a delicate skin. Injury is often wrought to the skin also, especially in cold weather, by defective drying. Water rapidly evaporates from the skin, and in doing so lowers its temperature—hence the chapping of the skin on the imperfectly dried wrists of children. The best remedy is, of course, some substance which prevents this rapid evaporation. Typical of such substances is glycerine, with its affinity for a quantum of water. One may also mention the natural fat of sheep's wool, often known as lanoline. The petroleum preparation called vaseline is also good. All of these substances are antiseptic, or at least incapable of sustaining microbe life.

Something has already been said as to the fashion in which we destroy the hair, and it may safely be declared that every one's hair would last longer if ~~The care of~~ we avoided hats, especially tight hats, and ~~the hair~~ if we devoted as much care to the cleanliness of the scalp as to that of the rest of the skin. In so far as hats must be worn, they should be ventilated. Even then, however, the hat supplies the best possible conditions for the growth of the microbes which ultimately destroy the hair. The temperature within a panama hat is stated to be less than that induced by any other form of headgear. The difference in its favour as compared with the silk hat is 11° Fahrenheit. If we consider that, besides raising the temperature, the hat

interferes with evaporation, reduces the supply of arterial blood, and interferes with the removal of venous blood, it will be evident that the health of the hair is endangered. Doubtless, less injury would be wrought if at least once a day the scalp were thoroughly cleansed, preferably with some really effective carbolic soap, and then subjected to such friction as would help to restore the circulation. For some incomprehensible reason, however, many men who are most scrupulous as to the rest of the body, object to washing that area of the skin which accumulates dirt more certainly and rapidly than any other. There is a nonsensical notion abroad that washing the scalp injures the hair. I should like to know why. No one tells us that it injures the hair of the chin, and one would make short work of any nurse who applied this remarkable principle to the scalp of a baby. It is, of course, sheer nonsense, and perhaps more peculiarly inexplicable than most superstitions.¹

For any given person, then, the way to preserve the hair as long as possible is to care for it on ordinary principles, such as would be applied to the health of the skin in any other part of the body. The health of the hair, of course, depends upon the health of the skin from which it grows. When this has been said and insisted upon, however, there will certainly remain great discrepancies when one man is compared with another. We have only asserted, however, that, for any given person, the measures suggested will promote and prolong the life of the hair. Nevertheless, many people who neglect the hair altogether may show no sign of baldness at eighty, whilst in others, despite any amount of attention, the process will quite definitely begin in

¹ The explanation may be that when washing the scalp, we find that some hairs come out. Not knowing the elementary fact that this loss will be duly replaced by any healthy hair-follicle, we imagine that these hairs are lost for ever.

the twenties. These are differences which cannot be explained at present, but there seems to be some evidence that they are transmissible by heredity, as in the case of the hair of the so-called rhinoceros mouse, lately studied by the Mendelians, which has a fine coat of hair in youth, but a naked skin at maturity.

These individual variations are paralleled by the loss of colour. I should not like to say to what extent, if any, rational care of the scalp will postpone greyness of the hair, but it is certain that premature greyness is an inherent quality which can be transmitted by inheritance, and though baldness and greyness are quite independent, each depends upon the failure of the corresponding group of cells or cell functions in the hair follicle. It seems really probable that the scalp hair is going the way of other hair. It may be that its better persistence in women is partly due to sexual selection as well as to the undoubtedly better conditions of women's headgear. If the hair of the male scalp is to persist as a human structure, it must be through sexual selection, inducing women to choose this character in their partners, as suggested in an early chapter. But as choice for such a character is entirely beneath human dignity, I am the last person to commend it. In point of fact, the commoner feminine tendency—despite what was earlier said—seems to be to like as little hair in men as possible, and from the point of view of health, hair may be allowed to go. In injuries to the scalp or skull, the hairless scalp, being almost certainly the cleanliest, will come off best, and the shaven-headed Indian, sitting unperturbed in the full glare of the sun, is proof that custom can inure the head to the absence of all protection, whether natural or artificial.

CARE OF THE TEETH

THE care of the teeth is a subject which one approaches with reluctance, by no means because it is unimportant, but because there is difficulty in knowing what to say. As we have suggested in the case of the hair, and as is in general true for every organ and function of the body, an ounce of heredity is worth one hundred pounds of culture. Every doctrine as to the care of the hair or of the teeth may be utterly defied by some fortunate people with the most absolute impunity and the most admirable consequences; and the converse statement is no less true. Nothing can be promised, then; nor can any evil results be predicted if the best advice is ignored. The best possible advice, that one should be sprung from germinal matter such as produces good teeth, is impracticable, and the substantial importance of any other may almost be questioned. A further difficulty is that competent and thoughtful dentists, such as Dr. Sim Wallace, have lately been criticising the tooth-brush, in general and in particular, though we had thought that if there were anything certain it was that we should all brush the teeth at least twice a day.

One thing is certain, however. It is that no one should permit himself to go about with even a single decayed and uncared-for tooth. Modern students of diet may assure us, as some do, that we should be grateful for the departure of our teeth, and should beware of replacing them; the argument being that, with fewer teeth in later life, we are less apt to eat to excess. But whether or not this be so, it is certain that the decayed tooth is, as such, a source of danger, whether it is best repaired or removed, or whether, after removal, it should be replaced. Dental caries is due to microbes. It is their products that defile the odour of the mouth in which they are permitted to thrive, and many modern pathologists are inclined to attach very

grave importance to the absorption of these products into the blood, whilst there can be little doubt that the swallowing of them plays into the hands of defective mastication in producing indigestion. No adult and no child should be permitted to suffer from these risks. If we note that about ninety per cent. of the children in our elementary schools have carious teeth, it is evident that there is room for improvement here.

At least we are still confining ourselves to what is certain in saying that the value of good dentistry can scarcely be over-estimated. The contrast The value
of good
dentistry between good and bad dentistry is at least as marked as in any other profession, and good dentistry is now extraordinarily good. One would require to be very poor indeed in order to be unable to afford the fees of a first-class dentist, even though each visit cost a week's income: for the possession of good teeth, or at the very least the non-possession of decayed teeth, is very nearly if not quite a *sine quâ non* of health. The price of the good dentist's work has to be reckoned as against the amount of life which it provides for us. Further, we have to remember that it endures, as bad work does not. Other means of judgment failing, the reader may take it that the dentist who is ready to extract teeth should be practising some other profession, like the doctor who is free with his soporifics. The case of the tooth which really requires extraction under the conditions of modern dentistry is extreme, and can only occur after the grossest neglect on the part of its owner. I question very much whether any one who has to wear artificial teeth before forty is not wholly to blame himself. As one boasting teeth such as are only found in an advanced stage of civilisation, the writer speaks with some personal knowledge.

The possession of sound teeth and a clean mouth means, first of all, that we are free from a constant

source of blood-poisoning. Even if it be denied that pernicious anæmia and other grave disorders can be traced to the septic mouth, it is certain that this is the cause of ill health quite serious enough.

Further, it means very nearly complete immunity from neuralgia, of which by far the commonest cause is dental. One may note in passing that the doctor whom you consult for neuralgia, and who prescribes phenacetin whilst neglecting to examine or inquire after the teeth, is a man to be shunned as irresponsible and incompetent. No one averts or cures so much neuralgia as the dentist.

Yet further, the absence of decayed teeth means the absence of channels of infection which may be of the most serious kind. Gum-boils are not of great importance though they be nuisance enough, but much more serious disorder of the jaws may follow from septic infection through the teeth, and there is very substantial evidence that, especially in children, decayed teeth are the channels of tuberculous infection which may show itself in glands of the neck, but may also attack organs of far greater importance. It has clearly to be understood that the decayed tooth definitely provides a clear route for microbes into the lymphatic vessels if not into the blood stream itself.

And lastly, the presence of a sufficient number of healthy teeth—or, if so much cannot be said, of adequately repaired teeth—provides the possibility of adequate mastication, with all that this means for the first stage of digestion.

It cannot be questioned that our teeth are inferior to those of our ancestors, and to those of savage peoples.

The decay-
dence of
modern
teeth

The explanations commonly put forward concern themselves entirely with the treatment of the teeth, and especially with the neglect of mastication; not least in early years, when this process must promote the blood-supply to the growing teeth. The quality of our food is also

criticised; many dentists suggesting—in direct opposition to the Fletcherites—that we should take considerable quantities of fibrous food—of which a high proportion is quite indigestible and innutritious—in order to keep the teeth clean in a fashion superior to that which any tooth-brush can effect. It has to be recognised that the admirable teeth of the savage have never known tooth-brush or dentifrice; and the same is true of the skulls, each with thirty-two perfect teeth, which we dig up from the remote past in our own country or from the remains of ancient Egypt.

The biologist, however, who alone is aware of the importance of heredity and natural selection in determining the character of races, and of individuals too, will be inclined to suppose that our defective teeth are largely due to the cessation of natural selection at the present day. Everything proves that there are inherent variations in the quality of teeth, and it is extremely probable that, like other inherent qualities, these are transmissible by inheritance. Time must have been when they were of importance in the struggle for existence. It was of “survival-value” to have good teeth. Those who had bad teeth would, on the other hand, tend towards elimination. But for many generations the importance of these characters as regards survival has been reduced to a minimum, and we should therefore expect, as in every other instance where selection ceases, to find degeneration.

And now we come to our difficulties. Are we, for instance, to follow the highly competent observers who condemn the tooth-brush, or are we to follow the customary course?

Dental
hygiene

I think we must continue to use the tooth-brush, and that if we were wise we should use it after every meal. But the technique of its use must be attended to. The lateral motion of the brush merely cleanses the flat surface of the teeth, which is least in need of attention.

The proper motion is up and down, so as to clear as far as may be the spaces between the teeth. He is fortunate in whom these spaces are fairly considerable. A kind of movement of the brush similar to that of stropping a razor is to be employed. The brush should be small; it should not be too hard, except, perhaps, for teeth of the very best quality, which are least in need of it at all. Every dentist knows that the injudicious use of too hard tooth-brushes, especially with side to side motion, and a badly chosen dentifrice, conduces to wearing away the enamel on the exposed aspect, especially of the canine teeth, which receive the full brunt of the scraping process that is misguidedly employed. Many readers may thus convict themselves of the responsibility for gaps in the enamel on the outer surface of the canine teeth, and may remember with regret that the dentist's ministrations in this neighbourhood are particularly apt to be painful.

The dentifrice employed should be solid. Many pleasant fluids are on the market, most of which are no doubt antiseptic, and so far to be commended, but persons who have used them and found that tartar nevertheless accumulates upon the teeth may find that the substitution of a powder will remove this tartar, and prevent its subsequent accumulation. (I am disquieted by the expert argument that tartar is protective, but probably the weight of the evidence is against this opinion.) It is, of course, essential that the powder should be incapable of scratching the enamel of the teeth. Probably pumice-stone is to be condemned on this ground. The best dentifrice will be a powder capable of mechanically cleansing but not of injuring the teeth; it will be antiseptic, thereby opposing the life of the microbes which cause dental caries; and it will be alkaline, thereby neutralising the acids which those microbes form, and which dissolve the salts of the teeth. Perhaps a half-and-half mixture of carbolic powder

and magnesia is as good a tooth-powder as any. It is cheap, especially if one does the mixing oneself and buys the ingredients in large quantities, such as a pound at a time.

Though we are not here concerned with children, yet an important paper read before the Annual Meeting of the British Dental Association in 1908 is so significant, that a word or two regarding it must be added. What is said is perfectly relevant to the teeth of the adult. Mr. Edward Wallis quotes various statistics, which seem to show that the figure 90 **The teeth of children** per cent., quoted above as regards school children with defective teeth, is decidedly too low; the figure is probably above 95 per cent. Now it has been proved that the serious septic complications of scarlet fever are much more common and severe in cases where the mouth is dirty. Mr. Wallis has gone further, and has shown that children with the worst teeth are not only unhealthy in appearance, but below the average in weight. He found also that, as regards school work, they were below the average of their ages in nearly all cases, and sometimes markedly so. On the whole, he declares that "The mental and physical development of the children attending the public elementary schools is much hindered by the wholesale neglect from which their teeth are suffering; that their susceptibility to diseased conditions is much higher than it would be if their mouths were kept healthy; and, moreover, that should they be unfortunate enough to contract scarlet fever, the probability of their suffering from one or other of the serious complications that frequently follow this disease would be considerably increased. In short, the prospect of a child deriving the full benefit of the instruction provided in an elementary school is much impaired by the prevailing condition of the teeth; and when the children enter upon wage-earning careers, they do so, in a great number of cases, with impaired con-

stitutions, and with a physique unable to cope with the present-day struggle for existence."

In Germany already they have begun to take this question seriously. It may fairly be described as of national importance, and if, on the demise of the present order of politicians, we are blessed with successors capable of seeing these things, it will be well for us.

Of course, one does not decry politicians without reserve. Dead politicians ultimately furnish nourishment for grass, and so become useful. It is merely the very small minority of politicians that at any time happen to be alive against whom the man of science has a grudge.

ON GROWING STOUT AND GROWING OLD

GRANTED that most of us over-eat at all times, it is probable that we err most grievously during the warm weather. Since the weather is warm we require to produce less heat, and therefore need less fuel. As to this, our appetites, if they are given a fair chance, will commonly inform us, but the recognised proceeding, of course, is to cheat and stimulate the appetite, so that its natural and desirable tendency to diminish may be prevented. Any credible assertion of the consequences of over-eating is a public service, I make free to say; but we may admit that the psychological moment at which to make and begin to keep a good resolution about over-eating is the moment at which the tempter, which we call the (vitiating) appetite, speaks with less seductive voice. Thus it would be better to preach to the too prosperous reader just when it is likeliest that the admonitions may be needed: during the hot weather, when he has just begun to cozen his appetite under the delusion that its comparative failure is a misfortune, and not rather a lightening of temptation. But there is a second reason why our good resolutions as to over-eating should be made not on the 1st of January, but, say, the 1st of June or July. Not only will they be easier to keep in the hot weather, but it is more necessary that they should be kept. That which was perhaps not a greatly excessive diet six months ago is certainly an excessive diet now, simply because less of it can be properly utilised by the body. The consequences of over-eating are equally bad whether in winter or summer, but the term is a wholly relative one, depending amongst other things, upon the external temperature, and we are more liable to offend against the laws of nature in this respect in summer time.

Let us take the case of the middle-aged or elderly man, and ask ourselves a simple question: what is John Bull's his normal contour? Now, this has been corporation answered, and the answer is accepted as true, by many generations of draughtsmen, and not a day passes but there is instilled into the mind of the newspaper reader the notion that a prosperous gentleman of middle-age should have a contour such as that of the John Bull of the cartoonists. Yet to the critical eye John Bull's corporation thus depicted is nothing other than a deformity, a sign of physical decadence, just as objectionable in its own way as extreme cadaverousness. I do not say that John Bull should be depicted as slim as the boys whose youthful outline adds such grace to the cricket at Lord's when the Schools or 'Varsities play each other. As John Bull reaches maturity he should certainly put on flesh, and, in consequence, he will become physically stronger, but the person presented by the cartoonists as typical of our national prosperity must have the utmost difficulty in lacing his own boots, could not catch a horse-'bus, let alone a motor-'bus, is evidently incapable of any kind of prolonged exertion, and almost certainly suffers from fatty infiltration of the heart. These are not signs of personal prosperity.

Now observe our ingenious euphemism. In the whole realm of life there are no two tissues more contrasted Putting on than flesh and fat. Flesh is muscle, con- flesh—or fat sisting of extremely active cells of living protoplasm; fat also consists of cells, but they contain practically no protoplasm at all, and instead of it are simply filled with lifeless oil. Fat cells are scarcely more worthy to be called alive than the cells which compose our visible nails or hair. Fat is in no sense part of the living tissue of the body. It may act as a reserve of food; it may serve to relieve pressure and to retain the warmth of the body; but muscular tissue

is crammed with life, and directly serves its purposes. We recognise this distinction, whilst ignoring it, when we politely say that a man is "putting on flesh;" but he is never doing anything of the sort when we say so. He is putting on fat; nay, more, if he continues the process he will very soon begin to replace flesh by fat. His muscle cells, including those of his heart, will degenerate, die, and become replaced by lifeless oil or fat. I say advisedly, then, that when a man is said to be putting on flesh he is losing flesh, for flesh is muscle, and the muscles of a man who is becoming stout are undergoing either simple atrophy or else atrophy with fatty degeneration and infiltration.

No one has any business whatever to be as stout as the John Bull of our artists—who are wise in what they select for the touch of caricature. That gentleman's corporation is a sign not of health but disease. He eats too much and works too little. His blood pressure is too high, his arteries are becoming hard, his power of thought is becoming impaired; in due course he will have a "shock." If he recovers from it, his bad habits will soon recur and he will have another. If the state of the nation and its probable future has any correspondence to the physical state of the grossly overfed and degenerate person whom the cartoonists portray, it is high time that the national will was made and our possessions appropriately bequeathed.

As a German writer pointed out long ago, "the whole secret of prolonging one's life consists in doing nothing to shorten it," and there is nothing more certain than that over-eating shortens life. It is only quite lately, however, that we have begun to understand this question, and one of the discoveries we have made is that though obesity shortens life and is a sign of over-eating, yet many a man may over-eat who does not become obese. There is no question here of making unpleasant remarks about stout people alone. The

truth is that very few of us indeed can escape a general condemnation, whether we are stout or not. Thus, there is no need for the stout person to point out that he eats no more than his neighbour who is not stout. Most probably his neighbour also eats excessively, but merely has a different method of disposing of the surplus. Now, the point—already insisted upon—is that for every individual, according to his bodily structure, his habits as to exercise, clothing, work, worry, and so forth, there is on any given day a certain amount of food which is the best for his health, and all beyond that is merely an excess—which is *not* disposed of as easily as water by a duck's back. Matter is indestructible, we remember, and if, having use for a certain amount of matter, we deposit more within ourselves, something has to be done with it. It is quite possible that in some cases the least amount of harm may be effected by turning the superfluity into fat and storing it away as conveniently as possible. Though this is bad enough in many ways, it may be less injurious than the attempt of the body to consume and destroy the superfluous fuel. In many cases this is done, so that thousands of people who eat far more than is good for them never become stout, though they may be eating more largely and doing themselves more harm than their plump neighbours, at whom they point the finger of ascetic scorn.

Now, it is really nothing to me that my neighbour should be too stout, but it is a serious matter to me, **Age and the** as a student and lover of society, that the **arteries** mental powers of the middle-aged and elderly of both sexes should fall in any way below the level which may be expected of them. Perhaps my elders will forgive me for preaching at them if I aver that my prime motive is a recognition of the value of experience. Human action is controlled by intelligence, and not instinct; but though intelligence can learn

everything, it has everything to learn. For myself, I profoundly believe in government by the elderly *in years*. It is the fact of biography that the greatest works in philosophy and political thought and science and organisation have been the achievements of the elderly *in years*. What could be more natural? Other things being equal, the mere lapse of time, the mere length of education, must tell.

But now observe the famous dictum that "a man is as old as his arteries." For myself, I prefer to say that a man is as old as his mind, and that a man's body is as old as his arteries; but mind is correlated with brain, and all nervous tissue is absolutely and continuously at the mercy of its blood-supply. There is, therefore, a direct correlation between the health of a man's arteries and the health of his mental powers, as every doctor knows. The great achievements of thought which stand to the credit of elderly men and old men were most certainly associated with young arteries. Such a man—quite a rarity in modern society—is in effect a young man with an old man's experience. He, and he alone, can make the best of both ages, and where he exists he may be found to dominate and to lead his class, whatever it be.

In consequence of recent investigations, it seems extremely probable that before long the doctors will be compelled on all hands to denounce over-eating as probably the chief cause of the premature arterial degeneration, involving premature physical degeneration, which is one of the lamentable facts of our time. Our surplus food is, in effect, a mild poison, or the source of poisonous substances produced within the body. Circulating in the blood-vessels continuously, these poisons naturally injure the delicate living cells which line their walls, and arterial degeneration follows, with consequences which show themselves in every organ of the body, but most markedly, of course, in the most

sensitive and delicate and needy of them all, which is the brain. Arterio-sclerosis, or arterial hardening, is one of the most important of all diseases, though the public hears little of it. I am not stating anything novel or sensational. Every doctor knows the truth of the saying that "a man is as old as his arteries," and great medical conferences will devote themselves for days to nothing but this one subject. This morbid arterial change may actually be felt by the doctor at almost any elderly wrist in the country, and the wrist at which it is felt is elderly, whatever its owner's years. Arterial degeneration is the cause of practically all cases of apoplexy or shock. No man can burst a healthy blood-vessel from within. The bursting is a mere accident, dependent upon the fact that the vessel is diseased. But, quite apart from these calamities, arterial hardening is a personal and national curse, especially as it effects the efficiency, the capacity for adaptation, and the energy of those who rule us, whether in the pulpit, or the press, or Parliament, or elsewhere. There appears to be a tendency towards the incursion of the young man and the driving out of the old, but what I want to see is young heads on old shoulders, elderly men with soft arteries, who will combine the mental activity and fitness of youth with the experience of age. Most of our elderly men suffer from chronic food-poisoning with arterial hardening, and they need some one to tell them so. This is quite an unselfish task, for all the virtues of youth lie in its soft arteries, so to say, and if the middle-aged know how to keep their own arteries soft, and so their own minds plastic, inexperienced youth will have longer to wait for the prizes it desires.

Regarded *sub specie æternitatis*, a man is as old as his mind, and of the properly constituted mind no age can be predicated, for the psychical does not recognise the category of time. On the other hand, we all know

adult men and women who have never really grown up. The "music-hall mind" is practically identical, as Professor Earl Barnes has pointed out, with the "twelve-year-old mind." Of those we daily meet, not a few have the minds of mere pre-pubertal children plus a certain amount of worldly experience and more than a child's control over the immediate expression of its emotions. At the other end of life are met many old men and women who retain the optimism normal to healthy youth, and its avidity for new ideas, plus a nicer discrimination—and that "restless energy" which, as Goethe said, "alone proves the man." If we agree that a man is as old as his mind—that is to say, as old as his essential self—these elderly people are really still in their prime, and should properly be regarded as ageless.

The lower animals, in general, may be said to die—their gigantic infant mortality apart—from old age, murder, starvation, and, to a quite subordinate extent in the case of animals in their natural state, from disease. Man does not die in appreciable numbers of murder, or accident, or starvation. The overwhelming cause of death amongst our kind is disease. The infectious diseases, including tuberculosis, are responsible for the greater part of the death-roll at all the earlier ages, but it is disease of another kind that is responsible for nearly all the deaths of the elderly. Having passed through measles and whooping-cough, and the like, acquiring an immunity which persists, or having passed the ages at which we are most susceptible to them, we should thereafter die only of old age. But deaths which can be properly ascribed to this cause are extremely rare. Analogy with the case of the lower animals, noting the proportion of the developmental period to the whole life, suggests most forcibly that the life of man should properly be far longer than it is. The hale and mentally alert centenarian should really

be a commonplace, and the octogenarian who can effectively criticise his juniors and add to his life's achievements, as Lord Kelvin did and Mr. Galton does, should be the rule rather than the rare exception. Nowadays we have a greatly lowered death-rate, an unprecedented control over disease, and vast stores of physiological knowledge utterly unknown to former generations; but I very much doubt whether we produce more really living elderly men and women than did the ancient world. The average duration of life has enormously increased, but society does not gain, nor yet the individual, as we should if it were not for some causes of senility and premature death which we have not yet controlled. I assert, in short, that, apart from cancer and one or two other maladies, the vast majority of deaths even after fifty or sixty years, are rightly to be regarded as premature: and I ask the reader to consider with me the deplorable fact, to which must be added another, in some ways yet more deplorable, that, of many who do live at these ages, the distinctively *human* life has really expired. They scarcely do more than cumber the ground, reminding us of the saying of Schiller, too often true, that "the lamp of genius burns quicker than the lamp of life," and of the dictum of Huxley, lately expounded by Professor Osler, that men of science should be pole-axed at sixty lest, by hardening or "softening" of the brain, they should retard further progress.

There is something radically wrong in an epoch wherein we hear so frequently the cry "too old at forty." A creature that takes twenty-five years or so to reach maturity has no business to be too old at forty. There is no such instance in the sub-human world. And, as a matter of fact, even if we confine ourselves to what is in the main a case of neuro-muscular skill, we find that the finest batsman of the day is thirty-six or seven, that he broke all

records, including his own, a year or two ago; and that, a short time ago, the champion, then what in cricket is a veteran among veterans—forty-seven to be exact—set up a new record by scoring a thousand runs before the end of May. In other sports, John Roberts and many more might be named.

But least of all should we hear the cry “too old at forty” when, as I have often pointed out, the dominance of mind over muscle as an instrument of survival-value is more conspicuous than ever before in the world’s history. If pedestrianism were still the first need of man, as it was, I suppose, when he lived by the chase, “too old at forty” might be, and doubtless was, inevitable and intelligible; to-day, when mental qualities (and experience not the least) determine fitness, “too old at forty” is a monstrous anachronism. Yet I am assured that only too often, however well-intentioned the employer, the phrase fits the facts and must be acted upon.

I am quite prepared to believe that longevity is a congenital character—if the phrase be permitted—and may be transmitted by inheritance. I do not need to go far to find an example of the most striking family longevity. But one cannot say more than “prepared to believe,” in the absence of evidence which *fully* excludes the factor of the conduct of life in such cases. In the instance to which I refer the remarkable longevity of two numerous generations is associated with strict canons of life, temperance in all things from childhood upwards, and existence under highly favourable conditions. It would be unscientific in the extreme to regard this as a case of inborn tendency to longevity, in the failure of proof that the conduct of life has not been the determining factor.

And this brings me to my point, which is best stated in the words already quoted: “The whole secret of prolonging life consists in doing nothing to shorten it.”

Now, *the* criterion of age is the health of the arteries. Pitiable indeed is the spectacle of the men and women who concern themselves so seriously with trifles in this regard, whilst the weightier matters of the law of life go wholly unregarded. Their anxiety concerns itself with such things as crow's-feet and wrinkles, grey hair or baldness, which are all cutaneous matters, and, being cutaneous, are alike conspicuous and insignificant. The senility that is only skin-deep is a very superficial affair, and every one knows that it may co-exist with splendid vigour and skill of nerve and mind. One of the best and fastest bowlers in England has the least hair—almost as little as a certain fine batsman—at the top of the averages as I write—who, like him, has played for his country. As to grey hair, a much better sign of cutaneous senility than baldness, no one but the stupid employer takes that seriously, one would think. I do not care that my friend has a senile skin if he has the soft arteries of health, the heart of a boy, and the mind of mature manhood withal.

As I begin to recount some of the chief causes which shorten life, I am reminded of the tale, recently published, of the school-teacher in America of senility who, asked the shape of the earth, replied, "Wal, some like it round and some like it flat, and I've jinnerly teached it both ways." This was an eminently judicious proceeding, but he who is prepared to teach both ways according to taste is a liar and a traitor to truth and mankind, however popular or successful he may be. Thus one must preach the ungrateful truth that many of us ruin our arteries and thereby beckon to senility by chronic over-feeding, which is none other than chronic food-poisoning. We dig our graves with our teeth. I do not believe that everything comes to him who waits; rather does everything come to him who works or to him who goes to meet it. The proverb is true of death, however, yet how few of

us do not run to meet him half way by a slow suicide which no one reprobates, but which is a thousand times more reprehensible than the overwhelming majority of the suicides which we call disgraceful.

We have yet to learn that the changes which the pathologists call degeneration are really the changes of intoxication. Even in technical pathology we are now learning that this is so. The pulmonary changes in consumption were for centuries regarded as degenerative. The patient's tissues went into a premature "decline." We now know that the case is one of poisoning, and we have identified the poisoner. Most physicians still retain, however, a similarly false conception of arterial hardening and rigidity and brittleness, with all it involves. When such arteries are met in a man of forty, the phrase is "premature senile degeneration." It is nothing of the sort, observes the pathology which knows that words, as Hobbes said, are the counters of wise men but the money of fools only. It is a case of chronic intoxication. The causes may be food-products, or alcohol, or lead, or possibly tobacco—though this last is extremely doubtful—and however difficult it may be for the doctor to be candid with his patients, I, who have none, may be candid here. You will find a man—a clerk, perhaps—who, in order to do his duty to his family, will dye the grey hairs at his temple, whilst, if he but knew and would slide his finger down a little further so as to feel his temporal artery as it passes upwards in front of the ear, he might there find facts immeasurably more important, and far more completely under his own control.

If the reader asks me how to keep his arteries young, I reply that this is almost the whole question of personal hygiene; but its substance would take the form "Thou shalt not," many times repeated. The injunctions for him who would play cricket with his great-grandchildren or rule the State at eighty are not posi-

tive but negative. There are many sources of the blood-poisoning which leads to arterial poisoning. The poisons may be of external origin, like those I have mentioned, or of internal origin. Violent and persistent exercise, for instance, involves not only the raising of the pressure of the blood, which naturally compels the arteries to become thickened beyond their capacity for maintenance, but also the production of muscular fatigue-products which are definitely toxic. I would repeat the warning given by Professor Clifford Allbutt at the Royal Institution a few years ago, to the man whose blood-pressure remains persistently too high. He will soon grow "old," and will do well to consult a physician. The best sort for him is one of years and experience—but soft arteries.

THE ELIXIR OF YOUTH

IN the last chapter we discussed certain of the physical aspects of growing old, but there are others. Here we may try to discover the secret of perpetual youth as that secret is known to the happy few. Very likely heredity plays a part here, but if we make formal recognition of that probability, we may ignore it for the future, admitting, however, that we cannot expect compliance with ideal methods of life to achieve similar results in all cases.

Merely referring the interested reader to the work of Metchnikoff, a few considerations, most of which are not there to be found, may be noted. Natural old First of all, it may be wholly denied that, age after the period of adolescence, years are any real criterion of age. It is true for the tree that its very structure measures the yearly revolution of our planet round the sun. But we neither lose nor lay a layer of our persons in correspondence with this revolution. It is nothing to us. So far as body is concerned, the arteries are the best criterion of age, and their state is not dependent upon the passage of time as such. From the physical standpoint a man is as old as he feels. The woman who decides to have no more birthdays is perfectly warranted in so doing so long as her mind remains young. There is no need to take count of planetary revolutions if one feels as young as ever. Nothing will arrest senile changes in the skin, but it is possible to prevent senile changes in the soul.

As to the nature of normal old age in man, we really know very little. We can only infer it from the observation of animals, and as most of the animals which we observe are domesticated, over-fed, and under-exercised, there is a source of fallacy there too. As we have seen, most of what we call old age in man is a morbid deterioration, the beginnings of which may be

well-marked in the thirties, or, on the other hand, may fail to appear even in the eighties, except only so far as the skin is concerned.

Of course, we cannot avoid recognising that there is a difference between the child's mind, or, if you prefer, the child's nervous system, and the adult mind and nervous system. This we may and must admit without, however, having to admit that the change we recognise is a progressive one. The difference between ten and twenty—or even, I fear, between twenty and thirty—is a necessary one. But it by no means follows that any substantial difference between thirty and sixty is necessary. Here and there we can all find notable instances to the contrary.

As compared with the child, the adult is less capable of making nervous acquirements. On this score he is inferior. In fact, it is doubtless true that, on all essential grounds, the adult mind is inferior to the child's mind: breadth of knowledge not being an essential ground. The power of making acquirements, or of learning by experience and practice, is an expression of adaptation. Every living organ or function, in losing its power of adaptation, is on the high road towards death. All such power gone, there is either absolute death, or death in life. Beware, then, of the loss of power to change your mind. This gone, you will never change anything outside you; you will never be a cause again, except as an obstacle is a cause. Even at twenty or thirty our modifiability is less than what it was. You will never learn to play the violin unless you began before you were ten: if the question whether you play arises, you need not answer, "I don't know, I've never tried." If you have played other ball games—and you are much to be pitied if you have not—you may make some sort of a cricketer on taking up the game at twenty, but you will never learn to hook fast bowling. Childhood is the time to learn, because it is the time of

highest modifiability. After childhood has passed, our modifiability, adaptability, educability, capacity to learn and to change, falls to the level of maturity, whatever that level be for the person in question; *but it should not appreciably fall below that level for half a century.*

The child beats us also in memory and in curiosity; that is, of course, provided it be an uneducated child. It need hardly be said that the child subjected to the process of mental destruction we call education is an object for a pathological museum. If it has long enough been told not to ask questions, and if, by the process we call training the memory, its memory has been sufficiently obliterated, the child may be as stupid as an adult. That, however, is another story, which I shall consider in another volume.

It follows from what has been said that young people, provided that they be uneducated—as Wordsworth and Spencer and most other consummate men of genius were uneducated—are good company for everybody. They are, of course, good company for each other, and the solitary child is greatly to be pitied, but they are excellent company for their seniors. It is not merely that your education scarcely begins until you have children to do it for you, but that they keep you young. The great principle is, in Herbert Spencer's words, "Be a boy as long as you can." If you can spare some of your hours from the dark and vain ways of adult men to the company of children, you will find that their interest in things and their joy of living are infectious, as every mental state is infectious through that omnipresent mental force we call suggestion. Thus old people can be visibly observed growing younger when they are put in young company. Nothing could be more singularly untrue, on its physical side, than the ancient belief that an old man could be revived and rejuvenated by a girl's com-

pany. But, on the psychical side there is no more salient truth.

I have seen an old woman who had all her life been a nurse of young children, age on superannuation almost as visibly as Rider Haggard's "She" when her power left her. The arrival of the child of a third generation provided her with new work, her "rheumatism" disappeared, the eye brightened, life became worth living again, and for nearly four years past she has been growing steadily younger—so that, in course of time, she and her young charge, between whom on our ordinary reckoning there are nearly seventy years, should be just about the same essential age. The reader must have made similar observations. We have here, of course, a ready explanation of the fact that, if other things be only approximately equal, mothers and fathers look, feel, and *are* younger at any given age than their unmarried contemporaries. It is not easy to find good things to say about death, and I do not know that the theologians help us much. But at least if there were no death there could be no parenthood.

Though it is true that we cannot learn the violin at twenty, and in general that the possibility of making neuro-muscular acquirements becomes severely limited after youth is past, yet so far as the higher attributes of the mind are concerned, we should progress indefinitely. This capacity for unlimited mental growth is our privilege, just because we are intelligent and not instinctive beings. The psychologists tell us that, after all, intelligence is none other than instinct become plastic, and there are foreshadowings of this plasticity in many of the higher animals. But only in ourselves is it limitless. So far as the higher mind is concerned, we may learn and change and grow in our eighties or nineties as at any other age. One only wishes that convention permitted free comment on a case of this kind with which I am

fortunate enough to be familiar—a great student of heredity and the mind, promulgator of the new and supreme science of eugenics or race-culture, discoverer of the anti-cyclone, the variety of finger-prints, the non-transmissibility of acquired characters, the law of filial regression, and much more than all this—who is always the youngest man in the room, has the enthusiasm and the optimism of a boy, with a thousand times the judgment, and has only one complaint to make of his years—that they dissuade his juniors from offering criticisms. I am sure that at no past period in his life, which is nearly completing its ninth decade, has his mind made more advance in a given time than it does now—that is, of course, since the end of adolescence. Can you imagine how wise he must be?

One of the secrets of youth, then, is to keep working: not necessarily money-making, but working. Everything, except old age, comes to him The secrets who works. Not only is it better to wear of perpetual out than to rust out, but it takes much youth longer. Indeed the mark of the living organism is that it does not wear out because, unlike other machines, it has the power of internal re-creation. We have been evolved by the struggle for existence, and are therefore strugglers by constitution. When we cease to work, we degenerate. In five years, after retiring from business or from work, a man commonly ages more than he did in twenty preceding years, unless he is fortunate enough to have some hobby or interest—children or china, or whatever it be—that saves him. If he finds no other occupation, he spends more and more time over his meals, and so bad physical conditions go hand in hand with bad psychical conditions to hurry him into the grave—where alone he is useful.

And just as one must keep on working, so one must keep on learning—simply learning for learning's sake is worth while at this later time of life. The learning

of Greek roots, the vagaries of irregular verbs and particles and the like, is a pitiable exercise for the child's mind. A great deal of the subject matter of what we at present call education would have a useful place, however, in filling the otherwise unfilled hours of elderly people. At least, if they can find nothing better to learn, it were better to memorise a page of irregular verbs than to learn nothing.

Another cardinal rule for the preservation of youth is to preserve the optimism of youth. It may be said that this is just what the old man, because he is old, cannot do, but that is only partly true. If you find occupation, and if you recognise the danger of incipient pessimism, it is possible to protect yourself. I cannot do better than quote a page, one of his very best, from my distinguished friend, Professor Forel of Zürich, a master amongst masters:—

Never
surrender
your
optimism

“The modern man wears himself out in restless earning in order that he shall be able to rest in old age. But when the man who has worked all the time gets old he discovers that without work he can no longer exist. Only the idler and the pleasure-seeker who has squandered his life becomes even lazier than ever in his old age (if that is possible), because he has never exercised his neurones. If any one wants as happy an old age as possible, he must first of all never betray his optimism; second, never brood over the past and the dead; third, work away to the last breath, to keep as much of his cerebral elasticity as possible. The pessimistic, peevish discontent of so many selfish old men and women usually rests (when it is not pathological) on their inactivity. They want to sit down in peace, and instead of peace find discontent with the world and themselves. The quarrelsome grandmothers and mothers-in-law, as well as the tyrannical old men who demand everything and do nothing, may trace their bad pecu-

liarities, so far as they are acquired and not inherited, partly to changes in the brain that come on with age, but partly, as we have seen, to a petty, selfish stunting of their spirit, and to the lack of an ideal end in life. They busy themselves in blaming and tormenting their children, grandchildren, children-in-law, and nephews, instead of using what is left of their powers in useful work. But the old man whose brain is still sound, and who is not ashamed to keep on thinking and working, rejoices, even in the evening of his life, in the world and people and the happiness of youth, and enjoys love and consideration, instead of being the object of aversion or ridicule."

Without any derogation to the fine work of Metchnikoff, it may be suggested that advice like this is worth an ocean of sour milk: only, unfortunately, like the out-patient of any hospital, most of us desire that the doctor shall order something to swallow and reckon little of his advice.

Special attention may be directed to the advice not to brood over the past and the dead. This also is of cardinal importance for the elderly. You must look forward. The penalty for the backward gaze is the penalty that was exacted from Lot's wife: you are turned into a pillar of salt, or something equally destitute of life. It is well and right to love and admire the past, to be grateful to it, and to learn from it. It is never right to live for it. This is the only too common tendency of nations, institutions, and individuals, and the consequent fate of all is the same. The nation or institution or individual that would survive must live for the future. There may or may not be evidence of purpose in nature; there must be evidence of purpose in man, or he is doomed. The mark of the old man who is not really old is the forward gaze. To live for the day that is dead is to be dead to the day that is alive. Browning, who was a psychologist, knew this, and in

one of his very greatest poems has told us so. The grammarian went on learning and looking forward, notwithstanding the passage of years. His motto was "No end to learning . . . what's time? Leave Now for dogs and apes! Man has Forever." He had a "great thing to pursue," had no time to look behind him nor to anticipate the approach of death, and so he lived to be old, and even when he was "dead from the waist down," his mind was still living and learning.

The lamentable case is where the lamp of genius, as Schiller said, burns quicker than the lamp of life; or rather where, genius or no genius, the body **Death of the mind** survives the soul. In such cases death is a boon to the individual and to society. As Newman said, to live is to change. When the mind loses the capacity to change, it is no longer alive. I have heard the question of the immortality of the soul discussed by persons in whose own case at least the soul was obviously dead, and had been for years. Any question as to what would happen to it on the demise of the body was superfluous. Some of these dead souls are very malodorous, and highly injurious to the public health. The man who loves and admires ideal old age, wherein experience and judgment and charity and patience have been added to, but have not replaced the enthusiasm and optimism and modifiability of youth, must in similar measure deplore, if not loathe, that real senility to be found at all ages, which has lost all ideals, all purpose, all onward vision, and spreads nothing but contagious death.

It is impossible, I believe, to over-estimate the advantages which the society of the future will reap from the application of the scientific study of the natural history of the mind—when old men as well as young shall dream dreams, and shall lead the world instead of lagging behind it.

Dr. Clouston, in his remarkable work on the "Hygiene of Mind"—the writing of which the present writer is proud to have suggested—has an admirable chapter on the decadent period. A few remarks from that may be quoted, but we may specially note that on all essential points Dr. Clouston is in absolute agreement with the words of Professor Forel cited above. These are elderly men, though doubtless with soft arteries, as their writings prove, who have had very exceptional opportunities for the study of this subject throughout many past decades, and if one adds to theirs the name of Dr. George Keith, I hope the reader will admit that what is said in this chapter is said on the very highest authority obtainable.

Dr. Clouston, like every one else who understands this subject, insists upon the value of occupation and purpose in old age, or rather in the prevention of old age. He points out that the hygiene of this period should begin in middle life—"over-work, over-worry, idleness and aimlessness, love of over-eating and drinking, and too little exercise during the period of manhood and womanhood are the things to be avoided during maturity, if old age is to be indefinitely postponed." As the years go on, the diet should become restricted and simpler, fruits, vegetables, cereals, and fish being representative of the good, whilst, as we have seen, the ordinary scientific criticisms of alcohol become more urgent than ever. The following remark will support what I have said above—"The typical environment of old age consists of a quiet home, sons, daughters, and grandchildren, not necessarily living in the home, but frequently accessible." Cicero knew this, as readers of his famous work *De Senectute* will remember. Again, Dr. Clouston insists upon the importance of the conscious effort to preserve the youth in one—"it is best carried out by seeing young people, by efforts to sym-

pathise with them, and even by following at times and in a mild way some youthful pursuit or game. . . . Loneliness is certainly bad for the old." The jealousy of the young which is seen in some old people is thus disastrous to themselves. To know this may not cure them, but they should know it.

If these principles were generally known and acted upon, the burden of the old generation upon the younger would be transformed into a boon. Human progress would be accelerated, and the reverence for old age—which some of us were taught in our youth, but which, like other excellent Victorian beliefs, is now out of fashion—would be warranted by the existence on all hands of old people of both sexes, whose claim to "honour, love, obedience, troops of friends," was indisputable. The time will come, perhaps, when the term "old woman" will be no longer one of contempt, but will indicate a very wise and precious and beautiful thing, such as an old woman may and ought to be. The importance of this whole subject is increased by the circumstance that the current fall in the death-rate does not depend upon a diminution in the infant mortality, scandalously easy though that diminution be, but mainly upon the keeping alive of elderly people under modern conditions. My hope is that this chapter may serve in some small degree, at least, towards keeping alive their minds as well as their bodies.

THE CARE OF THE SENSES

THOUGH we have travelled far onwards since the days of John Locke, it remains more conspicuously true than ever for the psychologist that sensation is the beginning of mind; nor can he question at all the dictum of Ruskin that acuity, delicacy, accuracy, and discrimination in sensation are the marks of the high type in mankind. It is some little consolation at least that the wretched creature who offers you matches probably feels less acutely for himself than you do for him.

Thus, if man is really to reach human stature, the sedulous care and education of the senses is a foremost necessity—incalculably more important than the culture of his muscles, which may be an end in itself for the hippopotamus but not for *homo erectus*. One is tempted to forget that the present volume is designed for the adult, who is already in great measure made or marred, and to devote some space to the study of the ideal means by which the senses may be trained for the lasting benefit of both mind and body, as in the case of the fortunate children who were lately dancing in London with Miss Isadora Duncan. The reader, however, is past the hope of such opportunities for himself. Here we are, of this generation—products, in great measure, of the blindness and folly, and despite of everything that nature cries aloud, which governed the early education of most of us. We may make up our minds that this shall not occur again, but so far as we are concerned, it has occurred, and we must make the best of the results.

It is well to assure ourselves that attention to the well-being of the eyes is worth while. An American writer, Dr. Gould, has lately gained much Eyes and attention for the thesis that eye-strain is eye-strain responsible for most of the minor ills of civilised life. He has turned to the biographies of many distinguished

men and found evidence that satisfied him there. In the case of Herbert Spencer, however, had Dr. Gould waited for the publication of the *Autobiography*, he would there have found that the characteristic symptoms of "eye-strain" were produced in that case whether the patient read *or was read to*. I offer this as merely a single instance of the fashion in which an author with a theory is apt to be misled. I doubt whether one expert oculist in a thousand retiring from practice would accept more than, say, ten per cent. of Dr. Gould's theory; but even that ten per cent. is of great importance, and, despite all his rashness and excess of statement, Dr. Gould has undoubtedly done great service in drawing attention to the matter. We may certainly say that the reader who suffers from indeterminate and various symptoms, such as headache, dyspepsia, and the like, will do well to consult an oculist, even though the chances be perhaps a hundred to one that the cause of his trouble is not his eyes, but his bowel.

Granting, then, that there is such a thing as eye-strain, whatever its exact limits and importance be, we may add the much less questionable assertion that the eyes themselves may suffer if they are misused, and that the survival-value of the eyes, and especially in their use at short distances, is so great in the present stage of civilisation as to demand even more attention than many other organs about which we are more particular. Teeth can be replaced, but there is no replacing eyes; whilst, on the other hand, their preservation is, as a rule, a matter of no difficulty whatever.

The eye was made for distant vision, for broad views: it is naturally focussed upon infinity. The normal eye in a state of complete muscular rest is accurately fitted to focus parallel rays—such as proceed from a star. Here is evidently a physiological theme for the poet. Nevertheless, civilisation might almost

be defined as involving a steady abbreviation of the range of vision. The use of the eye for reading and writing has become dominant, and the normal eye, as we have said, requires muscular effort to accommodate itself for such short distances. Still more effort is required for the long-sighted eye. This last effort involves an eye-strain which is indisputable—the cause of many wretched children's headaches. The long-sighted reader is not to be congratulated, and had better begin the wearing of glasses at once, little though they may enhance the face.

Short-sightedness, however, is much more common, and is undoubtedly becoming still more so. There can be little doubt that in past ages short-sightedness was a most serious disadvantage in the struggle for life, and the short-sighted people on the whole tended towards elimination. We are changing all that. As we shall see, it is now good to be short-sighted, at least in some degree, and certainly any elimination of the short-sighted by a process of natural selection has now completely lapsed. But whilst heredity therefore counts in some measure for the increase in short-sightedness, environment or education also acts in the same direction. The use of the eyes at short distances involves an internal muscular strain which gradually alters the shape of the eye-ball itself, so that it becomes a short-sighted eye, and thus requires less muscular strain, if any, for accommodation to vision at short distances. This is palpably an adaptive change to the circumstances of life, and in our discussion of this question it is time that we looked at the thing from the high biological standpoint. In any case, human beings would be nowhere without the capacity for adaptation, which they possess in a millionfold more abundance than any other living creature, and the inexhaustibleness of which, dependent upon the educability of the brain, explains man's dom-

inance of the earth. The fact that the normal eye, which required effort for use at short distances, can in the course of a few years be transformed into an abnormal eye, with which reading and writing for hours together becomes easy and free from fatigue, should not be occasion for a diatribe against civilisation or against eyes in general, but rather for a chorus of admiration at this latest instance of human adaptability. Some day, when biological principles are common property, it will not be necessary to make these protests.

I say advisedly, then, that the astonishingly alarming figures quoted by doctors, whilst freely to be accepted, may require re-interpretation. When we are told that in one school in Philadelphia two-thirds of the children had defective vision, or that of six hundred thousand London school children ten per cent. were found to have less than one-third of normal vision, we require to ask ourselves what is the exact meaning of normal and of defective in such statements. On leaving school at eighteen the present writer played cricket without glasses. He then devoted himself for six years to reading, never using his eyes for distant vision except by accident. For ten years after leaving school his eyes became steadily more and more short-sighted, but apparently have now reached their limit in this direction. He has to wear glasses for cricket. On the ordinary medical standard, then, his eyes, normal at eighteen, are grossly defective at thirty. On the other hand, they never fail him; he can and does use them at reading distance during at least four-fifths of his waking hours every day in the year, and has never yet had a headache or ceased working or reading on account of his eyes. This is a mere typical instance which many a reader who has observed himself can parallel. The eyes have become adapted to their function. When, therefore, we read that "in Ger-

many Cohn finds that twenty-two per cent. of the lower classes are short-sighted or myopic, while fifty-eight per cent. of the upper classes are similarly afflicted," perhaps we should only be grateful for this "affliction" which permits a man to do his appointed work in ease and comfort, whilst his neighbour who boasts of his "strong eyes" cannot read for an hour without the beginnings of a headache. It may be suggested, then, that students of this matter should devote themselves to determining the answers to a few elementary questions, as, for instance—What shape of eye-ball is best fitted for a civilised life? How is that shape of eye-ball to be best attained? At what age may it be aimed at? What shape or shapes of eye-ball are legitimately to be called normal? Is the vision defective which can be used at a few inches for hours on end, but is uncertain about the identity of people across the street, or is the vision defective which requires no aid at the theatre or in the playing-field, but brings on a headache with half-an-hour's reading? Is it an affliction to adapt your eyes by natural means to the work of your lives? If short-sightedness, whether inherent or acquired, be the best kind of vision for modern man, ought we not to redistribute our adjectives in talking of these ocular conditions?

The hygienist is, of course, bound on every ground to approve the principle of daylight saving. Something has already been said about the value of light on general grounds. As regards the care of the eyes, the simple principle on which we should act is that substitutes for daylight should reproduce its conditions as closely as possible. There is every *a priori* reason for expecting that the best light for purposes of vision, as also for the maintenance of health in other ways, must be the sunlight, to which man has been undergoing adaptation for so many ages. We shall learn in course of time, as we

The best
light for
vision

have not yet learnt, how to produce artificial light of which the constitution is practically identical with that of sunlight. The present forms of artificial light may and do often contain ingredients unsuited to the eyes, ingredients perhaps visible, perhaps invisible. Here may be a very real cause of eye-strain, involving grave nervous fatigue, if not, indeed, structural injury, but it is a form of eye-strain which the oculist with his lenses can do nothing for. If we remember how perfectly the eyes can be focussed, but how absolutely without protection they are from any abnormal form of illumination, we may suspect that perhaps the question of lenses is often subsidiary in the matter of real eye-strain to the question of the quality of the light which the lenses are required to focus.

A notable feature of the *diffused daylight*, which is best for vision, is that it is *steady*. Considered on this score alone, electric light is an advance upon gas, and gas was a very great advance upon candles. The second great feature of daylight is the breadth of the surface from which the illumination comes; in other words, its *diffuseness*. This condition we must reproduce; the source of artificial lighting should be unidentifiable. We speak of a "soft light," and by that we mean one which does not hurt or fatigue the eyes. The typical soft light is diffused daylight. Other things being equal, there can be no doubt of the correctness of Lord Rayleigh's suggestion, that the soft light is that which comes from a large surface of illumination. In saying other things being equal, it is meant, of course, to remind us that the light of sodium vapour and the light of mercury vapour, and the light of an arc lamp, differ greatly in their own constitution, and that these differences are doubtless of great physiological importance, little though they have been investigated hitherto. But, given any kind of light, it will be softest when it reaches our eyes from a large surface.

This is a principle which we all more or less recognise and apply, but which must be much more applied. Its value was conspicuously brought to my notice several years ago in a schoolboy visit to Messrs. Rowntree's Cocoa Works, where one saw a room containing six hundred girls, who were packing chocolates by the light of arc lamps thrown downwards from a white ceiling, the lamps themselves being entirely hidden. Something might be added about the ventilation of that room, and its many other admirable features. But it is quite certain that many wealthy people, through ignorance, expose their eyes to much injury to which the eyes of those work girls were not subjected.

Our artificial light, then, must be steady and must be diffused; in other words, we should see by steady light reflected from a large surface. Further—though this is at present largely beyond our control—the quality of the light should be as near as possible to that of sunlight. Recent French observers have taught us that a light of given intensity has a very various action upon the pupil according to its quality. For instance, a naked arc light causes such contraction of the pupil that we employ only a small fraction of the light offered. Light of a similar intensity, due to an incandescent lamp, is utilised to double the extent—the pupil contracting so much less. Thus the use of arc lamps in rooms—unless they be most carefully shaded—is not only a deplorable vulgarity, but is also wasteful and injurious to the eyes. Nothing fatigues the eye so much as the arc lamp, as has been proved by noting the duration of after-images produced by various kinds of light of equal intensity.

In the mere matter of intensity, which is most probably of small importance compared with the quality of artificial light, as these new experiments show, we have, of course, to find a mean between opposed extremes. It is very probable that children's eyes are

injured by defective lighting of schoolrooms. As far as we adults are concerned, mostly favoured as we are with electric light—all light, by the way, is electric, but that is another story—our error is much more likely to be in the direction of over-illumination. There is exceedingly little sense in reading or writing by a light so intense that the contractor muscle of the pupil must be in a state of high and unresting activity in order to cut off the excess of illumination as far as possible. It would be cheaper and less fatiguing to use a less intense light, and save purse and pupil alike.

For the rest, something has already been said as to the treatment of walls, and we may merely remind ourselves that the patterned wall is a mistake, at any rate so far as the eye with the least hypersensitiveness is concerned; and that, on general principles as well as judging by experience, we shall do well to reproduce the green of nature, especially the green of fresh young leaves, in our living rooms. Dead white we shall use with caution, and remember in general that all is not good for the eyes that glitters. We shall persistently avoid the introduction into our own rooms of the lighting schemes seen in fashionable restaurants, or of naked lights of any kind. We shall read, of course, with a light behind us, passing over either shoulder so long as we read, and of course over the left shoulder when we write. He who has to use his eyes very extensively may do well to give them intervals of rest in the course of hard work. Rest may be gained by closing the eyes or by having some featureless space to rest them upon, or by the use of landscapes in a room inducing us to relax the effort of accommodation which, especially for the far-sighted eye, involves so much strain. The far-sighted person will not read without glasses.

A word must be added in self-defence, lest the reader should suppose that one approves of the educational

practices which help to produce so many short-sighted children. It is not good that the child's eyes should be adapted for sedentary work. The proper work of a child is its play—open-air play, play with balls and the like. The time will come quite soon enough when the eye has to be used at shorter range, and the length of its axis will be modified by that use.

If, however, we are to set children to read, or are to do much reading ourselves, let us attend to the details of lighting; let us hope for the day when books will be printed in white letters upon a black ground, thus affording the eye rest everywhere, except where there is something it wishes to see; and, whilst admiring our artistic friends who desire to introduce all sorts of archaic type, let us prefer books printed in type of simple form, sufficiently large, and congratulate ourselves that for most of the time, at any rate, we are not compelled to con the kind of type which must go far to produce the quite superfluous short-sightedness of our German neighbours.

There is a casual remark made by Helmholtz, wholly unworthy of so great a man, to the effect that the eye is a bad piece of work. On the other ^{Ignorance} and, Darwin has a passage in a letter ^{and the} somewhere to the effect that the problem of ^{eye} explaining the evolution of the eye never presented itself to his mind's eye without making him feel rather queamish. If we consider for what the eye was made, and for what it is now extensively used; if we consider the conditions under which it is employed, continuous use at short distances, though its structure suggests design for use at short distances only momentarily; if we consider its endurance of microscopy and telescopic, and of all sorts of artificial light, and yet how rarely it succumbs to anything that can fairly be attributed to its use, I think we shall agree that the eye is a marvellous piece of vital mechanism. Nothing

has here been said about the details of its structure but the reader who will follow the general principles of its use, as here laid down, and who will not hesitate to wear glasses prescribed by a thoroughly expert medical man, will have little reason to think of his eyes so long as he lives. When symptoms arise, whether they be painful or merely novel—such as the tardy accommodation to comparative darkness, which one may notice at about forty-five—let him promptly consult a trustworthy expert, an oculist, and not an optician. The optician is a very skilful and useful person: he may often be cleverer in estimating refractive errors than the average practitioner, but he certainly cannot be so accurate as the oculist who checks his results by various methods. Apart from this, the optician, having only one method of relief, which is the use of lenses is very apt to find the need of lenses as the cause of all symptoms which come under his notice. He may be right in ninety per cent. of cases, but in the other ten per cent. his ignorance may be disastrous, and may certainly lead to total and irremediable blindness. In almost any one there is the possibility of internal ocular accidents, as they may be called, leading to a condition of local nervous paralysis, which, after a certain stage not even the eye surgeon, much less the optician, can cure. Amongst the great army of the blind there are many who are there to be numbered simply because they ignored the early and premonitory symptoms of glaucoma, or consulted an incompetent practitioner or an optician. The eye is a delicate piece of mechanism and the apparently innocent drug which the practitioner may employ in order to dilate the pupil for purposes of examination may, in so doing, be sufficient to precipitate irremediable disaster by raising the intra-ocular pressure. The present writer knows just enough about this subject to know that only the practising ophthalmologist knows the rudiments of it

When it comes to dropping atropine into eyes, even more than when it comes to prescribing what shape of lenses should be worn in front of them, the expert is the person to consult, and if a man has to be sacrificed to make the expert, that is the case in many other callings also. At his best the ophthalmic surgeon is a master of his work, and one may do very much worse than pay him a visit once a year, symptoms or no symptoms.

The commonest cause of blindness is gonorrhœal infection acquired by a baby as it opens its eyes to the light for the first time. This unspeakable abomination occurs every day in every civilised country on the earth, and certainly no apology will be offered for the remark that the reader, whilst considering the care of his own eyes, has it incumbent upon him to know what the infection of gonorrhœa may mean for a man's child. Some day, perhaps, public and professional opinion will have reached the point of knowledge and of courage necessary to protect infants from this horrible disease. Meanwhile the writer betrays his trust who ceases, in season and out of season, to declare that this consequence of venereal disease is one of the foulest and most abominable scandals by which our age will be measured at some distant day when man emerges from barbarism. Till then, the existence of this form of blindness may be commended to the inquiry of pious persons who may estimate its compatibility with Almighty Goodness and Justice. Should they have any difficulty therein, let them be appealed to in the name of childhood to come in and help those who, public opinion and Mrs. Grundy notwithstanding, mean to see the beginning of the end of these abominations before their own eyes are closed for ever.

In discussing sleep something has already been said

regarding the needs of the ear. I repeat that only under the most absolute necessity should the needs of the ear bedroom windows be closed. If the cotton-wool plugs alluded to fail to keep out the noise of cities, a very much more efficient and equally harmless implement consists of a plug made of cotton-wool saturated with wax, such that, when held in the fingers, it becomes soft enough to mould itself to the external canal of the ear. These plugs are remarkably effective. Those I happen to know are made by Messrs. Hawksley of Oxford Street, and are said to be employed by naval and military men to protect them from the vibrations of gunnery. Similar pads could be made anywhere.

There is too much noise in the day-time also, and the unfortunate thing is that every device for keeping it out is a device for keeping out fresh air. The wise citizen should do what he can to diminish this nuisance.

Only in very extreme cases can deafness be attributed to the effects of noise. It is rather the brain centres than the end organ of which one thinks in discussing this question: none the less so in the light of the recent assertions of alienists that morbid auditory phenomena are commoner now than they used to be. Probably the occurrence of auditory dreams should be regarded as a warning. We must remember that the hearing apparatus leads very directly to the highest areas of the brain. The more important the function of a sense, the more dangerous is its abuse. It is not good to hear "voices," and expert advice should certainly be taken whenever one suspects auditory hallucinations. Interesting clinical observations could doubtless be made on the members of various societies which study the supernatural, as they call it.

I do not think it is fair to employ, amongst one's means of protection, the device of depriving children

of noisy toys, unless, indeed, the noise cannot be confined to the nursery. Not only do these toys give enjoyment to the children, but they serve in the very earliest years to exercise the discrimination, if not the acuity, of the sense of hearing, and are thus perhaps the first rung on the ladder which leads to the heights of music.

Remembering that man is a mind, and that the organs of sense exist only for the brain, one is tempted to discuss the training of the ear. But here again the adult is largely made or marred. When we come to study children, something must be said as to the education of the ear, and its possibilities at an age when what fools understand by education is harmful and impertinent. Here, however, we must regretfully leave that subject over.

When we come to consider such a subject as the therapeutic value of music, we are, of course, in the realm of the indefinite, where there is *The use of* abundance of room for misinterpretation, music fallacy, and quackery. But I count it perhaps the one really grave omission from a former volume on "Worry," that it contains no word as to the unquestionably sanative effect of music on many morbid conditions of brain and mind. The reader's first protest may be based upon recollections of much torture suffered under street organs, pianists who confuse athletics with art, all living violinists except about ten, throaty tenors, and orchestral conductors who seem specifically deaf to the trombone. The victim of insomnia requires no further details of this sort from me, yet it remains true that, rightly employed, music of the right kind has a healing and soothing power, as well as possibilities of exhilaration not lightly to be discounted. Music is preëminently the social art, as its history and the evolution of hearing suffice to show. An insane person is typically a-social, but only few

and bad are those asylum cases where music does not provide a bond of sympathy and of common interest. Every large-minded asylum superintendent deliberately and of purpose uses music in abundance as a therapeutic means. Says Wordsworth of the Highland lass—

*"The music in my heart I bore
Long after it was heard no more";*

and poems like Browning's "Abt Vogler," and above all others, his "Saul," serve to illustrate for us what I mean. Experiments were made some years ago in the therapeutic use of music, not as in asylums—where the thing, though really therapeutic, is described as a mere recreation—but of ostensible purpose. This circumstance or some other led to their abandonment. Yet in the last two decades medicine has made great strides towards the recognition of the real constitution of man, and we may reasonably expect that before long music will take the place in modern therapeutics—especially nervous and mental therapeutics—which was allotted to it without question in days long dead. We have all felt like Browning's "Saul," though perhaps not on that gigantic scale; we have all heard tunes under which, as Browning says, "our hearts expand and grow one in the sense of this world's life." I believe that almost every man is capable of benefiting as Saul did under the influences which David brought to bear upon him.

As a music lover, holding strong opinions as to the distinction between the healthy and the morbid in art, which, from my point of view, remembering their respective influences upon mankind, I must regard as the most important of all æsthetic categories, I am tempted to indulge at length in a discussion of the kinds of music which one would recommend as hygienic, and those which one would ask certain patients to avoid. It is not at all a question of the intrinsic greatness

of the work. The tune of "John Brown's Body" is of the most elementary kind. Yet, joined as it is to an assertion of the greatest of all truths—that soul outlives body in some real sense—that tune, I believe, is good for any one at almost any time. In general, the same may be said of those great composers whom, judged by their work and their lives, and especially by Ruskin's great criterion, the influence of their work upon themselves, we judge to have been fundamentally healthy; abnormal, of course, because of their supreme greatness, but not morbid. I question whether the extremest and most poignant sorrow of Bach or Beethoven ever depressed any human being. It is a noble sorrow—the sorrow of noble men for noble objects; and I would prefer its influence upon a depressed patient to that of the inebriated joy of one or two clever but diseased composers, whom there would be no difficulty in naming. On the other hand—and the same is true of poetry—there is the whining sorrow, mainly of gastric or intestinal origin, which other men present us with. Often one is inclined to say that what they call their art would be more accurately called their *excreta*. This may be unique, wonderful, and effective, and may undoubtedly be perfectly sincere. It is therefore art, and real art. The healthy amateur is welcome to approve it, but just because it is essentially morbid, and because there is no disease so infectious as disease of the emotions, this is not the kind of music to which I, for one, would send an adolescent daughter of a neurasthenic friend.

To the reader who only identifies tunes by the ceremonial acts they induce—such as raising the hat—the foregoing will seem wholly out of place in a work on personal hygiene. But he is the exception, and it seems quite clear that the number of people almost yearly increases who listen to real music. As an incurable concert-goer, one has abundant opportunities of

noting the psychological effect of music of various kinds upon one's friends, if not upon oneself, and I am perfectly certain that there would be no difficulty in drawing up a pair of contrasted programmes, each containing great music, one of which should be styled hygienic, and the other quite definitely morbid or insanitary. The names of Bach and Beethoven would appear only on one of these. As for Wagner, he could be well represented in both, say by the "Meistersinger" in one, and by the prelude of the third act of "Tannhäuser" and the whole of "Tristan," except the sailor's song and King Mark's address, in the other. This by way of the merest outline illustration.

As I said many years ago, I look forward to the time when, gross infectious disease and the results of excess in eating and drinking having been abolished, the general practitioner will put "psychologist" on his door-plate as he now puts "surgeon." I can imagine such an one ordering a dose of Bach, or Beethoven, or Mozart, or Gluck, or Handel, or Brahms almost without writing further details on the prescription; but if he writes Tschaikowsky or Strauss or Wagner, I think he will have to distinguish between this work and that. I have seen a man the worse for the "Pathetic" symphony, very much the worse for "Tristan," and certainly none the better for even a pianoforte transcription of "Salome"; whereas any one might be the better for a dose of "Till Eulenspiegel."

I am exceedingly sorry if all this strikes the reader as so much nonsense or irrelevance, but I have been wanting to say it for a long time, and if I were of his opinion would not have said it now.

Something of the exquisite delicacy of the eye is known to every one. A considerable proportion of the ocular apparatus is visible, and it is palpably such that one would think twice before allowing any one without credentials to practise on it. Thus the public is not

much plagued with the eye quack. But the aural apparatus is wholly invisible, except for the merely degenerate sound-catcher which, in somewhat long-eared fashion, we call the ear. If one could see, as through a glass, even darkly, the apparatus of the middle and internal ear, there would perhaps be as little room for the ear quack as for the eye quack. Indeed, there has been no small temptation on this ground to follow the example of most writers on hygiene, who fill their pages with physiology and pathology and anatomy, and to give some description of the real ear, with its piano wires and drum heads, chain of conducting bonelets, hair cells, dampers, and so forth. Once get but the haziest notion of this amazing piece of apparatus (which, though historically no older than the fishes, is now much the most complex and delicate piece of mechanism in the whole body, the eye certainly not excepted), and no one but an absolute fool will allow himself to be treated by correspondence, by advertising institutes, and the like, for deafness or any other trouble connected with the ear. I believe it is because the intricacy of the thing is hidden that the existence of the ear quack is possible. If deafness and cerebral abscess, if meningitis and mastoid disease are curses, then the ear quack is a curse, for he is an abundant cause of all these evils. It is worth your while to consult a dentist who knows a canine from a molar tooth; it is worth your while to consult for your ears a skilled aurist. His skill you can judge of only by the nature of his qualifications and appointments, but at least you can exclude any one who treats your ear without examining it in so far as that can be done through the external canal, just as you would dismiss at once any one who proposed to deal with your eyes without using the ophthalmoscope, or to prescribe for chronic hoarseness without using the laryngoscope.

The larynx is of course not a sense organ, but I cannot refrain from adding a word or two here as to Care of the its care. Chiefly one desires to protest voice against the casual entrusting of the voice, whether for speaking or for singing, or of the larynx on account of hoarseness or pain, to any one but the expert. There must be some kind of reasonable probability that the person to whom you entrust an organ so delicate as the larynx has some acquaintance with its nature and needs. The case of the throat is somewhat different. Any practitioner can see the throat, nor is there the slightest difficulty in making applications to it. Also, if you are careful about the hygiene of the mouth and teeth, there should scarcely be much trouble for the adult in this region—unless, of course, he has neglected adenoids or large tonsils. But the larynx is normally invisible. It can only be seen by the use of the laryngoscope. It is a safe and certain rule, then, that the man who proposes to treat your larynx without examining it by means of a small warmed mirror passed into the back of the throat is undertaking a task for which he is incompetent. Of course there is no difficulty in using this mirror without gaining a view of anything more than the back of the tongue, and such things have happened. But at least if the mirror is not used, the larynx is certainly not seen, and if it is not seen it should not be treated.

As for the people to whom one entrusts one's voice for purposes of singing, or perhaps of speaking, they number as high a proportion of quacks, no doubt, as are to be found elsewhere. By their fruit ye shall know them. The method, whether called old Italian or other, which leaves the voice hoarse and tired for the rest of the day, must either be wrong or wrongly used. Also, I am inclined to think that the use of the voice in the middle of its compass is not merely safer, but probably quite as useful for all singing purposes, as

the repeated attack upon extremes. Half the secret of having a voice that lasts, and is pleasant and clear, and the use of which is unattended by fatigue, is, in speaking at least, to find the middle of your range and stay there—or, if anything, below it. This is sometimes rather a problem for members of large families, who have learnt to pitch their voices high in the effort to gain attention, and who find it difficult to get rid of this, which is the characteristic vice of the inexpert public speaker.

The state of the throat affects the voice. If one of the most important of all the resonators, such as the back of the throat, is blanketed with adenoids or encroached upon by large tonsils, the production of good tone is out of the question. These disorders are, however, much more serious in other ways. In children they induce mouth-breathing, and reduce the total amount of breathing, thus interfering with development of both mind and body. Many a stupid child needs scarcely more than a sharp finger nail to make him bright. In the adult and in the child also, these disorders of the throat offer points of entry to microbes. It is extremely probable that infections even so grave as that of tuberculosis are often incurred by this route.

As regards the other senses, nothing need be said. The sense of smell is trivial as compared with the importance of the nose as the respiratory route. One should be able to breathe freely and easily through either nostril, except at night, when the nostril next the pillow is commonly occluded by the congestion which that position induces in the mucous membrane lining it. As for the sense of taste, we rank it far too high, and its activity does many of us great injury. Touch is the mother of the senses, and its proper coördination with movement as practised in games is of great service to the developing brain. So far as the adult is concerned, nothing need be said about it.

THE RACIAL FUNCTIONS

BIOLOGY teaches that what, in ordinary language, is called the *body*, is a relatively late product of evolution, primarily called into being as the host of the germ-cells or trustee of the germ-plasm or the germ-cells—which are the race to be. We now recognise a sharp distinction between the body, or the *soma*, as it is called, with its various somatic tissues and organs, on the one hand, and the germinal or racial cells, on the other hand. These last are in the body, but not of it. They have in them the life of this world to come, and if the word holy is to be applied to anything on earth, it must certainly be applied to them. They do not exist for the individual, but the individual primarily exists for them. They are thus in principle and in practice to be distinguished as regards their needs from his needs. If they are described by the customary adjective, there is nothing more suggested than that they involve some possible relation between the individual and another individual of the opposite sex; but if, as I suggest, they are called racial,¹ the true reference is made to that for which they really exist. One has no desire to preach, but it may safely be maintained that, until the ideal of parenthood and of the absolute supremacy of the racial function, morally considered, is recognised; until such things as

¹ If we are to avoid any portion of the price of prudery, at present exacted from manhood, womanhood, youth, infancy, and the unborn in every civilised land, we shall do well, where possible, to use words which do not offend. Any study of the psychology of shame would have to reckon with the circumstance that that which may be done may not be mentioned, and that of two synonymous words, equally correct, one may be thought offensive and the other unobjectionable. The adjective "sexual," derived from the word "sex," is correctly formed, and means no more or less than its form implies. Sex, to which it refers, has been the source of all the higher developments of animal life, of human art, intellectual and moral passion. Nevertheless,

patriotism, and the sense of national duty as well as of personal responsibility and aspiration, are brought openly, deliberately, and without apology, to bear upon the racial instinct and its consequences, we shall see little substantial improvement in the human lot, little of the progress which withstands a moment's criticism.

The relation of these instincts and functions to the individual who exercises them, to his health of body and peace of mind, to the length and worth of his life, is intimate in the extreme; and, therefore, from the point of view of the individual, they cannot be ignored—not even if parenthood be to him in all its aspects insignificant and irrelevant. Let us then consider the natural development of the racial instinct, which, indeed, may be regarded as beginning that time of life to which this volume especially refers. If, for convenience, as we well might, we were to confine the term “child” to the first septennium (by the end of which the brain is at last almost completely formed), and for the next septennium were to speak of boy and girl, then the word “youth” might be applied at the dawn of puberty. Now and for the greater part of the years to come the human being has within him or her the racial instinct. During the first years of adolescence it is coming to its own, and thereafter it is established. Puberty, then, furnishes a legitimate and logical starting-point for the concerns of the present volume.

in English-speaking countries the adjective is practically *taboo*, though the phenomena of sex can also be observed in those countries. One may propose, then, that instead of speaking of the sexual instinct, sexual functions, and so forth, we should, for purposes of expediency, use another word to which no one will object—the word “racial.”

This has a further advantage. If we speak of the racial instinct, the racial functions, the racial organs, we shall not only be clearly understood, but we shall incidentally make the right claim for these things—shall put them upon the lofty plane which nature demands, and shall always be pointing the mind towards the purpose which consecrates them, and for which alone they exist.

There arise in both sexes, at this time, feelings and phenomena which are novel and unmistakable. Of the girl we shall not speak here. That question is reserved for a subsequent volume, and perfunctory treatment of it would be impertinent in both senses of the word. The boy now becomes for the first time, though not for the last, in less or greater measure, a victim of the accursed and damnable prudery which everywhere blasts human life. His father had to find out things for himself—perhaps he forgets how he found them out—and so must his son. The mother does not understand, and would not know how to begin if she did. The boy is legitimately and inevitably curious. “What does it mean?” No one has told him that, before long, he will have novel experiences—experiences which mean nothing less splendid than that he too may some day be called to the high duty and privilege of fatherhood. No one has suggested to him that, so far from being alarming, morbid, or shameworthy, they will indicate that he is beginning to become fit in health, development, and years for the incomparable task of handing on the lamp of human life to the future. The wisdom of all the ages, the medical profession, and the churches, his schoolmasters and parents, choose not to tell him that these nocturnal disturbances, whilst new to his experience, are normal, and the welcome proofs that he is normal. There is no sensible friend to suggest that they are a kind of practice, a kind of useful preparation, meaningless in themselves, but yet not without purpose, like the cricketer’s batting practice at the nets. How is he to know that his case is that of all healthy youths—that these phenomena spring spontaneously from inner developmental processes, and should be left to take their own courses; that they need no attention, no consideration, no scrutiny, no help, no repression?

We agree, then, that he shall not be taught the truth, the saving and splendid truth, regarding that racial function which too many churches in their imbecile and degraded folly have decried, and which they have left for every poisoner to defile. But it does not follow that if the boy is not taught by us he learns nothing. His seniors lie in wait for him with plenty of half-truths, which are also half-lies. He is taught exhaustively what these things mean proximately, but he is not taught that they are means to an end—rather that the means is the end; and the supreme end, the life that is to be, which endows the whole with grandeur and purpose, is ignored altogether. One writes in a somewhat ironical tone, but the truth is that nothing short of blazing indignation would be adequate to express that which every thinking person must feel directly his attention is devoted to the present state of affairs and its unspeakable consequences. Let us, then, consider the question more generally.

It is doubtless true that the power of the racial instinct grows by use—up to a certain point. It does not follow, however, that this is desirable either for the individual or for the race. With or without use, it is in any case powerful enough and to spare. It is a legitimate question for the evolutionist why this thing should exist in men in measure so vastly in excess of the need. One may venture to speculate that we inherit it from exceedingly remote ages, when the fate of the young human race was, so to say, trembling in the balance. Enemies were many and strong; weapons of both offence and defence were absent, as they are absent from no other animal or vegetable species; it was imperative that maternity should be exercised by every woman, and thus the racial instinct—not only in man, but in both sexes—must be strong enough and continuous

enough to be certainly counted upon. The case is vastly different now. It may be most confidently and dogmatically asserted that the additional activity of this instinct, obtained by its exercise, is superfluous, and will ere long become a burden to its possessor, if not injurious to others.

But every aptitude develops by use. We cannot think well unless we think often. The muscles which are never employed will atrophy. May not incapacity for parenthood (to put the matter on the right plane) follow upon a complete absence of any exercise of the racial instincts? There is an abundance of those who will declare that this is so. Perhaps the excellent and classical word "liar" is the best to apply to them, especially as it suggests the moral judgment which very nearly all, if not all, of these have earned. But whatever their motive, whether disinterested and scientific, whether it be the same as the motive which leads the older boy to encourage the younger one on the ground that "it is manly," and whether or not this means that the older boy has a disinterested desire to see the younger one develop into a worthy manhood—it may positively be asserted that the thing is not so. Arguments from the case of unexercised muscles, for instance, are ignorant and ridiculous. They involve a failure to recognise the radical distinction between the nature and mechanism of instinct, on the one hand, and acquired aptitudes, on the other hand. It is the mark of an instinct that it does not need practice for its successful exercise. The veriest tyro in psychology is familiar with this fact. That which is so certain *a priori* has been demonstrated a million times by experience. Celibacy may be unnatural, and it certainly is not the ideal state of a man or a woman. The praise of it by the churches, involving as it does the dispraise of the highest things in life, redounds to their eternal disgrace. They must abandon it in this century, or

this century will abandon them. But we are bound by the facts to say that continence prejudices not at all the existence or the potential effectiveness of the racial function, which may be successfully exercised after any number of years of abstinence.

The elder boy who tells lies to a younger is a quack; the groom or potman who does so is a quack. Their motive is a morbid gratification of their own. But there are abundance of other quacks whose motive is mercenary, and who make an ample living out of their abominable trade. They are readily accessible, for every book-stall provides the ignorant with Regarding their addresses. The really fortunate the quacks youth who has been instructed by his father, doctor, teacher, pastor—all four between them commonly failing completely—is immune: all the rest are susceptible, and many are attacked. There is no more black-guardly trade in existence, nor any for the permission of which society is so wholly without excuse. Our business here is the individual, but if it should chance that the reader is a father, or in any way responsible for boys, it will scarcely be necessary to apologise for certain of the foregoing remarks, which indicate the lines upon which, as it seems to me, one might rightly plan the instruction of youth in its years of greatest need. But our more proper business at the present time is to consider the means by which the individual may himself be protected from the quack; nor need we hesitate to include in this term the qualified quack—the doctor who condemns abstinence, and inclines to suggest that it will lead to immediate and remoter disaster. It passes my comprehension how any responsible person, least of all a doctor, acquainted with the facts of disease, to mention nothing else, can take upon himself the appalling risk of giving advice which, quite apart from its falsity to the facts of nature and experience, leads not once or twice, but in a great majority

of cases, to results so horrible, alike to the individual and to others, that the mind can scarcely tolerate dwelling upon them.

It is false, then, we repeat, to assert that continence is injurious immediately, or that it precludes the subsequent possibility of fatherhood. If it were true, it would be an inexplicable anomaly. The body, which we call the individual, primarily exists for the care and protection of the germinal tissues. They do not exist for it. Thus the health of the body does not depend upon the exercise of the racial function, but the fit exercise of that function depends upon the health of the body. There is, assuredly, a vital relation between the body, or soma, and the germ-plasm. The internal secretions, as they are called, of the racial organs undoubtedly affect the body for its good, as we shall see. But the health of these organs does not depend in any degree whatsoever upon whether or not their products come to anything. It depends upon their local freedom from disease, for which there is no assurance so safe as chastity, and upon the health of the blood which nourishes them, which in its turn depends upon the observance of the general principles of hygiene. If one is to be really a man or a woman, it is necessary that these characteristic organs be present, healthy and active. But compliance with these conditions does not necessitate any exercise of the racial functions at all, and there is no greater risk of their infraction than is incurred by the exercise of these functions in the common and too commonly accredited fashion.

One of the disgraceful and most successful methods practised by the quack is the use of suggestion for the purpose of persuading the victim that his characteristic powers are in peril. No sex chondria of once in a thousand times, where this belief is created, is there the slightest warrant for it. But

we are all more or less suggestible, and no instance better than this can serve the modern psychologists, who are almost yearly realising with more completeness than ever before the widespread and incredible potency of suggestion in human life.

There are few more lamentable things than hypochondria, the commonest and worst form of which focusses itself upon the racial functions. In a former volume I have done my best to offer some help to victims of hypochondria and worry in all their forms. Here one need only say that suggestion is its root. Only very rarely indeed, I believe, is this pure auto-suggestion. Even where it appears to be so, the chances are that the real germ of the thing is some half-remembered word or advertisement or warning. The conditions to-day are such that no one who can read can go long without laying himself open to opportunities of suggestion on this score. They assail us at every turn in more or less open guise, and they are reinforced by the vile fiction, written too often by the most abandoned of women, which glorifies sexual passion, and so leads the reader to believe that its diminution, or the risk of its diminution, is the greatest evil that he can fear.

One can only offer counter suggestion, or rather knowledge, which may protect the reader, as it should protect all who seek it in responsible quarters, from the snares of the suggester in all his or her forms.

In their own interests men have invented various doctrines, which they have even persuaded many women to believe. The first of these is that a large amount of indulgence is necessary for lie man's health. As has been asserted, this is not true. There is in it no measure of truth at all, and consideration of the penalties which so frequently follow upon indulgence, especially in the matter of disease, shows that it is too often the exact reverse of the

truth. No less important is the second doctrine invented by men, that in the absence of opportunities, adequate in amount, they would become irresponsible and uncontrollable. Thus, the married woman may actually have been taught by her own mother to approve and acquiesce in the existence of "the social evil" on the ground that it supplies a safety valve, and that without it she and her like could not expect to be safe. What is to be said of a doctrine which is untrue in the first place, and which in the second leads a woman to approve of an institution which too often means that she and her children are cursed for life by the foulest of diseases? It is safe to say that as long as women accept these lies, men will propagate them—to their own advantage, as they think, but ultimately to their hurt. It is to be hoped that we shall soon see an end of mothers who give their marriageable or married daughters this kind of instruction.

Readers of Professor Metchnikoff's book, "The Nature of Man," may recall what the author has to say regarding the racial instinct and its lack of balanced adaptation to function at the present day. All these views of Professor Metchnikoff on "disharmony" are really, of course, illustrations of what was once for all laid down by Spencer several decades ago. Real progress will be achieved, Spencer taught us, when, after long ages of evolution, the nature of man has achieved complete adaptation to the social state. There is no more conspicuous truth than that in respect of the racial instinct this adaptation has not been attained. If we consider the whole make-up of human nature as it is, many of the conditions under which we live, as social beings, are not natural, and difficulties necessarily arise. In the average man the strength of the racial instinct is grossly disproportionate to the only purpose for which it exists. This disproportion is not of our making, and its conse-

quences cannot be disposed of either by the present writer or any other. One or two principles, however, based upon the best results of modern psychology, may be laid down and commended to the reader's consideration.

If there is an omission in Forel's masterly work, *Die Sexuelle Frage*, it is a discussion of the means whereby the great excess of sex energy may be disposed of. It is true that he protests against pornography in every form, and it is certainly necessary to repeat without reserve his indictment of all means employed to aggravate and exacerbate that which is already excessive. On this point, of course, there is universal agreement, but there is an aspect of it which especially concerns the individual of education, such as one hopes to number amongst the readers of this book. The frankly and openly pornographic is the subject of attack by law and by other means. But this kind of stuff is, besides being pornographic, so crude and vulgar that it offends the educated palate. Thus there arises a subtler supply, no less noxious, which makes a successful appeal to many who would be simply disgusted by the other thing. Like the duchess in Mr. Pinero's play, they can persuade themselves that they read the author "for the exquisite purity of his style"; "the subject matter escapes me." But this duchess, in her every act, betrays her formation by the rubbish which she has read and has not escaped. The answer to this is that, even if the subject matter does escape the intellect, there are certain areas of the nervous apparatus which are nevertheless affected. No sane person will ask any other explanation for the success of some of the shameless writers, morally and in effect worse than any hapless creature of the streets, who find certain publishers for their works to-day. One has long believed that it is a pity to teach all and sundry to read. If only there were,

as there is not, some means of knowing which children would repay the trouble of teaching them, and which would convert the power into a personal disaster! At any rate, it must excite the laughter of devils to see this strange anomaly, man, not merely carrying the necessary animal about with him, as he must, but taking so much pains to keep it as much of an animal and make it as much of a nuisance as possible.

And now for our point. It is that there is possible for civilised man a transmutation of the sex energy in a fashion which has indeed already changed the face of the world. The glorification of sex, the deification of the beast, which is the secret of the success of many a novel, must give place to a real glorification of sex, dependent upon the psychological analysis of human nature as it is found in civilised man at his best. The evolutionary psychology—and the psychology which is not evolutionary is not psychology—teaches us that sex, of which some of us fear to speak, and which so many think a rather disgraceful thing, is the source, the single fountain-head, of all the higher activities of man. Already not a few men are capable of civilisation and domestication under the influence of woman. He is most a man and least a brute in whom is possible, through woman's agency, the transmutation of nearly all the sex energy into the myriad activities of art, invention, and thought which are displayed by civilised men. The lessons which we learn from such a great observer as Professor Stanley Hall are daily being supplemented.

More than once during the last twenty or thirty years, eager critics of the nonsense which is commonly talked about race have too hastily jumped at the argument offered them by savage man and savage childhood. Dr. Archdall Reid, for instance, points to the brightness and intelligence of the aboriginal Australian child, which may often beat its Euro-

pean classmate of the same age. That is true, but it is not the question. The point that matters is not the comparison of races before puberty, but after it. The question is, What does the emergence of the sex energy effect? The interested reader should acquaint himself with Mr. Dudley Kidd's unique and irresistible book, "Savage Childhood: A Study of Kafir Children." In that delightful volume, the photographs alone of which are worth its price, nothing comes out more clearly and finally than the influence of puberty in savage man. We speak here of a natural process, not of any consequence of ridiculous practices such as civilised people call education. Up to puberty, then, the Kafir child, the Kafir boy and girl, are fascinating, intelligent, sympathetic, everything that the ideal child ought to be. They have ideas, delightful play; they are artists, of course, as every natural child is an artist; nothing could be more promising. Says Mr. Kidd: "As a matter of fact, the savage is at his best, intellectually, emotionally, and morally, at the dawn of puberty. When puberty is drawing to a close, a degenerative process seems to set in, and the previous efflorescence of the faculties leads to no adequate fruitage in later life." If we regard the savage child as zero, then "the adult Kafir on this scale is often a minor quantity. . . . In nothing is this more marked than in the case of the imagination. Not a few observers have pointed out that the imagination in the Kafirs runs to seed after puberty; it would be truer to say that it runs to sex. Our main aim in the education of backward races should be to draw out, discipline, and strengthen the various faculties (and specially the imagination) of the children so that, when the age of puberty arrives, these faculties may be able to resist the degenerative and blighting tendencies that must soon arise. The politician in South Africa pays attention chiefly to the question of the franchise of

the native; the statesman is profoundly interested in the education of the children."

The pornographers, then, are doing their best to insure that the sex energy of civilised man—nor need the term wholly exclude woman—shall "run to sex," or rather, shall remain as crude, untransmuted sex. But it is in the higher employment of this most abundant reservoir that the psychologist sees the virtue of man at his best. We are beginning to realise that art and religion and sympathy and parenthood; even moral indignation on behalf of animals or children, or abstract causes like justice; even the passion for doing a great piece of work, like the writing of a system of philosophy that takes thirty-six years—that all these derive, by an alchemy a thousand times better worth attaining than any for which the Philosopher's Stone was sought, from that energy which at puberty is first generated in the body, but of which only a minute proportion is necessary for the direct racial purpose. What change of lead into gold can compare with this higher alchemy?

My suggestion, then, is that we should utilise these psychological truths in dealing with ourselves and with our children. Only restless activity, *The higher alchemy* says Goethe somewhere, proves the man. This restless activity is generated in the body by the racial organs. The feminine form of it is less restless, but is no less real, and has a similar origin. The case here is just the converse of that which assails us in the matter of money. This is a kind of money which, if not spent, *does* burn a hole in the pocket. Those in whom the possession of an almost inexhaustible purse during the years of maturity is not evident scarcely count as human beings, but rather as what John Stuart Mill called locomotive vegetables. The problem for the others—normal men—is how to get through their energy-income rightly, safely, and

profitably. Spend it they must, and quickly enough. Very nearly the whole of it—the whole of it, indeed, for the celibate—must be transmuted before expenditure, or by expenditure on higher planes. The best advice I can offer, then, true though trite, and perhaps vague, is to get a purpose and an interest, and to pursue them. (Too much is commonly expected from muscular expenditure alone—as, for instance, amongst public-school boys.) As every one knows, this is the means of safety. There will follow upon it a diminution in the call of the racial instinct as such. So much the better. Plenty of quacks will then be ready to assure us that we are losing our virility. The answer is that we are proving our virility by the transmutation of what would otherwise be bestiality.

We see, then—and to my mind modern psychology has nothing more valuable to teach us—that the disharmony is more apparent than real. To put it in another way, we see the lines on which may be attained that adaptation of human nature to the social state which Herbert Spencer recognised as the goal of progress, and the ideal of every wise friend of the human cause.

The kind of love which is alone worthy of the name and which makes lasting happiness in marriage is a product of the higher alchemy. It arises, beyond dispute, in sexual passion, even though it may never, even at first, have appeared in its untransmuted form. Perhaps from this point of view, man, after all, has not an excess of this passion—if *he knows how to achieve its transmutation*.

We see here, the reader may be reminded, a further illustration—and there is no better—of the principles of what we called the new asceticism. The old method was to starve out the beast, if not to eject him altogether by sheer force. But he is a necessary animal. The better way is to transform him; the animal is

the source of the truly human, but it must be humanised.

To speak of the transmutation of sex energy may seem to savour of something too intangible to be called scientific. Yet it is possible, in some measure at least, to reduce this idea to concrete and precise terms. In discussing drugs and drugging we saw that the substances which have an influence beneficial as well as potent upon the animal body are themselves of animal origin. That part of the body we call the brain conspicuously displays the benefits derived from such products as the secretion of the thyroid gland of the neck. Now we find that the reproductive glands, besides accommodating the germ-plasm, produce certain chemical compounds, in some measure capable of identification, which are to be numbered amongst the most important of all the internal secretions of the body. By an internal secretion we mean one which is destined to pass into the blood—as contrasted, for instance, with such a secretion as that of the kidneys, which is taken from the blood—not added to it.

Now the relevance of the principle of internal secretion will be granted in the case of the reproductive glands in the case of the female; but it might at first appear that the case of the male was different. Yet *some proportion*, at the very least, of the testicular secretion is as necessary for virility as the ovarian secretion for femineity. The cases of the two sexes are in reality strictly parallel. The great German pathologist, Virchow, has somewhere indulged in what is no less than a panegyric in honour of the ovaries—not as the site of production of germ-cells, though that is distinction enough, but as the source of substances which, passing into the blood, make womanhood possible. Exactly the same is true of the corresponding organs in the male. Their secretion makes manhood

possible. In their absence, or in the case of their early destruction by disease, manhood never appears; and there is no surer way in which to destroy existing manhood than in such a course of life as, in effect, deprives the body of the internal secretion of the testes. Manhood, then, is the product of the energy of the racial organs; and the conception of the transmutation of sex takes on a strictly rational and concrete aspect in the light of this fact. It is not merely that, as every competent and responsible authority asserts,¹ continence does no harm to the individual. It is that he positively and directly gains by the actual absorption of that secretion without which neither the achievement nor the maintenance of manhood is possible. The cost of fatherhood is exceedingly small—so small as to be wholly negligible. Nature has so ordained. A man may achieve this privilege in reasonable, or indeed in unreasonable abundance, and yet retain for his own use all but a wholly insignificant proportion of the invaluable substances which his racial organs, during the years of manhood, are always actively producing and pouring into his blood. The consequences of sexual excess are thus the most intelligible thing in the world. They depend not upon nervous excitement, but upon the definite loss to the blood of substances without which the vigour and energy of manhood, which have changed the face of the earth, are impossible. In the most literal and accurate possible senses of the words, the internal secretion of the *testes* has made human history by its absorption into the blood of men.

Nature, as we have hinted, has been most lavish in her provision of this necessity of manhood. No youth is to be alarmed at nocturnal phenomena on the

¹ See for instance, "Marriage and Disease" (Messrs. Rebman), a translation, abbreviated for the general reader, from the authoritative German work on this subject.

ground that they will cost him dear. The extent of the loss thus involved, if it be determined wholly by internal causes, and in the absence of previous habits which have thrown the whole neuro-chemical mechanism out of order, is wholly negligible—as is the loss involved in fatherhood.

Doubtless one is scarcely entitled to say that the foregoing accounts completely in physiological terms for what I have called the transmutation of sex. Psychology, individual and racial, must go further even than it is carried in Dr. MacDougall's recent work "Social Psychology," before we can wholly reduce to the language of science the conception on which I desire to insist; but we know enough already to see that it is not without a precise and assured foundation.

As every one knows, and as has been insisted upon by all the recent writers on the psychological relations of alcohol, this drug has a very definite relation to the racial instincts. The action is explained if we remember Shakespeare's phrase, "steal away his brains." Paralysing the "brains," which in this phrase stand for the powers of inhibition or control, the drug leaves lower areas of the nervous system uncontrolled, and thus unduly free to express themselves. The pure moralist will commonly say that the drug "calls out the baser instincts." Such a phrase misses the true psychological analysis, and the use of the word "base" in connection with the instinct which alone conditions the continuance of the human race, and which is therefore sacred, is an instance of the deplorable injury which the moralist often inflicts upon morality. But apart from these criticisms, we must wholly assent to the warning against alcohol for youth or adolescence. As Sir Victor Horsley says, "for the sake of national morality as well as physique, it is clear that in no

form whatever should alcohol be used by the young, either in childhood or adolescence." This author cites from Dr. Clement Dukes, the distinguished physician to Rugby School, the following words, which cannot be too widely read:—

"Beer is a drug which deadens the will-power and excites the animal instincts of the young; its relation therefore to immorality is most momentous. . . .

"In plain English, a master who allows his pupils to drink beer at bedtime, and a parent who sanctions it, implicitly says to them—

"‘I give you this beer at bedtime, well knowing that it will blunt your intellect, deaden your conscience, and diminish your will-power; and that at the same time it will excite your animal instincts.’"

As alcohol is the chief ally of the tubercle bacillus, so also it is the chief ally of the organism which causes syphilis, and the still humbler organism which causes gonorrhœa. Not only does the drug promote indulgence, not only does it lessen the care taken against infection, but it also directly lowers the bodily powers of resistance.

It is impossible to omit some brief reference to the infectious diseases which are so commonly associated with the unwise exercise of the racial instinct. The denouncer of quacks would be a proved quack himself if he attempted, by means of a book, to undertake the treatment of these maladies. But something useful can be said.

In the first place, every one who offers to send books, telling you how to treat yourself, is a quack. It is your money he wants, and he will give you less than nothing for it. In the second place, all the unqualified practitioners, including chemists, who profess to be able to deal with these things are, in so far as they do so, dangerous quacks. Nay, more, it is probably well within the truth to say that not one

The ques-
tion of
disease

qualified medical practitioner in a hundred is really competent to treat these things. Untreated, or inadequately treated, they are a source of disaster to the individual, and one of the least regarded of them, which liars describe as "no worse than a bad cold," often brings death to any one who is unfortunate enough to be his wife, not to mention congenital and incurable blindness to his children. On every ground, therefore, it is the duty of the patient, somehow or other, and no matter what the cost and preliminary pains, to follow the only course which adequately meets the case, and that is to find the doctor—he exists, though he is rare—who can and will treat these things as carefully and continuously and skilfully as they demand; and, having done so, to tell him the truth, to follow his directions scrupulously, and on no account whatever to pay any heed to those who promise to do in days or weeks what can in any case only be done in months or years, and certainly cannot be done by them in any period of time whatever. The reader who follows this advice on my recommendation will be my debtor to the end, and so also will be his wife and children, present or to come.

We must later take occasion to insist upon the importance of gonorrhœa in relation to parenthood, and especially to the eyes of a man's children. Scarcely within the limits of the present volume are the effects of this disease, as a prominent cause of sterility, upon the birth-rate. But it would be to betray an opportunity, to pass over the direct gravity of gonorrhœa as conveyed to woman by man. So far as man alone is concerned, they lie most abominably who declare that this disease is "no worse than a bad cold." But the discovery of its causal organism, the gonococcus, by Professor Neisser, has revealed a hitherto unsuspected malignancy in this malady in relation

The gravity
of gonor-
rheal infec-
tion

to woman. It is certainly not too much to say that not a day passes but many wives, throughout civilisation, receive this infection from their husbands. The abdominal surgeon and the gynæcologist are now able to estimate the consequences. More than half of all the cases in which it is necessary to open the female abdomen are now known to be due to the gonococcus: some authors state the figure as even ninety per cent. Wives are taught that their own happiness and safety depend upon the existence of prostitution; but the price which innocent wives yearly pay, in the shape of gonorrhœa, for the existence of prostitution, is past all adequate reckoning. It would still be too horrible to contemplate, if no such disease as syphilis existed. We are beginning to learn, thanks to the microscope and an aniline dye or two, which enable us to identify the gonococcus anywhere with ease and certainty, that though syphilis is no less noxious than we had thought it, gonorrhœa, judged, not by the relatively slight toll it exacts from man, but by its results in both sexes, is actually worse.

What our successors will think of the wicked hypocrisy and criminal prudery of the age which knowingly permits these abominations, and has the effrontery to do so in the name of virtue and the sacred cause of marriage, can only be surmised. The Press has lately learnt that matters of hygiene can usefully and profitably be discussed in its columns; but no well-conducted journal—no, not even the yellowest of the yellow—would raise a finger for the cause of innocence betrayed, defiled, and done to death, so far as this subject is concerned. Writers on hygiene are commonly no less cautious; nor have they the excuse of legislators and officials, that they are, in general, merely fools. The Eugenics Education Society, of London, single-handed, intends to flout almost all precedent, and break this brutal and murderous silence.

In America there has lately been founded the "Pennsylvania Society for the Prevention of Social Disease," a circular of which, "issued in the interests and for the protection of American women and their children," is before me as I write. All honour to these pioneers. In the interests of men, women, and children alike in Great Britain and in America, I cannot do better than conclude this chapter by quoting from this admirable "circular of information." The Society demands, as civilised society everywhere should, must, and some day certainly will demand:—

"The observance of a like standard of morals for men and women, and the public recognition by society at large of nature's inexorable decree that physical and moral hygiene must be identical for the two sexes if the health and vigour of the nation shall continue.

"Full knowledge that certain diseases which are now recognised as factors in depopulating civilised nations, and are widespread in our own America, appear to be most certainly preventable by one means—the education of our women in the necessity of demanding of their husbands, sons, and friends, lives as clean as their own, and therefore as free from the likelihood of transmitting disease.

" . . . At least fifty per cent. of the sterility (inability to produce children) among men and women is due to gonorrhœa or syphilis of the husband, usually transmitted from and by him to the wife.

"That notwithstanding these statistics there is an almost incredible, periodic clamour, not for the isolation and hospital treatment of infected prostitutes, but for their licensing and regulation.¹ Every prostitute is at

¹ Which completely fails to achieve its end wherever it is tried.

some time, and in most instances permanently, a focus for the distribution of one or both infections.

"That it is the consensus of opinion among physicians in America and throughout the world that illicit intercourse is neither necessary nor advantageous to the health or vigour of any male or female; on the contrary, that it renders the individual liable to dangers that immediately assail the integrity of the home and the health and welfare of the community at large."

CONCERNING HEREDITY

THE proposed limits of this volume have long been exceeded, but in the light of the knowledge of to-day, it is necessary, even though our subject be personal hygiene, to take some account at least of another question.

The history and fate of every living creature is determined by two factors—heredity and environment. No environment will reform a brain which, owing to hereditary defect, has never been properly formed: scarcely any environment short of infection by gross disease will utterly destroy a stock of the highest order. The study of personal hygiene is concerned only with the environmental factor, and it is the temptation of the hygienist to assume that this factor is all-important. Yet, if every statement and argument in the foregoing pages were true, and the whole truth, and were consistently acted upon, it would be mere folly for me to promise ideal results in every case. It is just because the hereditary factor is ignored that almost every hygienic rule seems to have its exceptions—that the toper, though rarely, may live to be a centenarian, and that, on the other hand, the observance of the hygienic regimen may seem to be futile. Those who look at medical problems from the biological standpoint are now beginning to appreciate the terms in which the hygienist must state his case. At the most he can only say that, to the best of his belief, any given individual will find more profit in the observance of his rules than in the breaking of them, but what the absolute result of either the observance or non-observance, no one can say unless he is prepared to estimate fully and in detail the hereditary factor in every case. In what is to follow, then, I endeavour—for the first time, I believe, in such a book as this—to repair this grave omission from the customary discussion of hygiene. It may be

argued that no profit can be gained, the reader's heredity being unalterable. Yet that is not wholly true.

In the first place, we must remember that every hereditary predisposition requires the environmental factor for its development. Thus, if once we can teach ourselves to study our own heredity so as to be informed of our own morbid inherent tendencies, we may perhaps be able to guide our own lives for our protection. It is impossible to say that very much can yet be done in this matter, and it is quite certain that even foreknowledge will be of no avail in many cases. Yet I am quite assured that the time will come when, for instance, the man whose own ancestral history suggests a probable predisposition to the charm of narcotics will take special precautions on that ground. Not so much as this even can be hoped, however, until the tremendous importance of heredity is generally realised. The subject is one very largely ignored and misunderstood by the medical profession; the general reader is not very apt to read books ostensibly dealing with it, and that is another reason why one should take the opportunity of insinuating it here.

But, in the second place, a short discussion of heredity in some of its bearings is now demanded as a supplement to a book on Personal Hygiene, because the time is at hand when all civilised nations will take account of the principle of Racial Hygiene or, as the present writer termed it several years ago, Negative Eugenics. One of our aims in the present work is happiness, and for many readers a condition of happiness is happy parenthood. It is well, then, that we should know something of those biological laws which go far to determine whether parenthood shall bring happiness or horror.

For these reasons we may consider in more general terms certain of the questions necessarily raised by any serious study of the racial or reproductive functions,

their bearing upon the individual and the duty of the individual towards them.

The germ-plasm, whether of future father or future mother, is already what it will be so far as its architecture is concerned. The individual, its creature and trustee, can modify it in no essential of structure. But its nutrition—its maintenance—is at his or her mercy. It depends for its food and oxygen upon him or her, just as does the unborn baby upon its mother. Thus we shall see that, in the case of alcohol and lead and certain of the poisons of disease, the individual may poison the germ-plasm with which he is entrusted for the future. It is nourished by his blood. If he dies, it will die; if he ceases to breathe, it will die of suffocation. This is his power over it, though he is only one of its by-products, the creature of a moment, and though it is endowed with potential immortality. In the image of Lucretius, he is like the runner who carries with him the lamp of life. For his brief span it is entrusted to him, and he must pass it on undimmed. What, then, is precisely the measure of his power over it?

He (or she, but this will be understood) may die without passing the lamp on at all, and so it dies with him. Whatever the "immortality of the germ-plasm" may or may not mean, it is certainly no more than what, in a phrase borrowed from a very different controversy, may be called "conditional immortality." Now, though it was the duty of the runners to hand on the lamp before they fell, there is no moral law, human or natural, which imposes a similar duty upon the individual human being. Though we are entrusted with this potentially immortal thing, for the care and transmission of which, indeed, the evolution of the individual at all was demanded, there is no moral compulsion to become a parent; and merely to refrain from performing this function is to demonstrate the power

of the mortal individual over the immortality of the germ-plasm, which is an immortality conditional upon the successive acts of mortal individuals. But are we not entitled to suggest that, for the future, the moral law will direct itself to this matter, no less surely than it directs itself to parenthood, so far as that concerns the already born? It is even now a duty for those who are high enough in the moral scale that, knowing themselves trustees of a germ-plasm which will certainly, or almost certainly, give rise to diseased or defective individuals, they shall put an end to it in their own persons by forgoing parenthood. If, on the other hand, an individual knows that, as his own person and personality may demonstrate, the germ-plasm which he bears, and of which he is himself a product, is worthy of transmission, since it is such as would probably give rise to worthy individuals, then may it not be a dereliction of his duty to the future if he refrains from parenthood?

For observe the nature of this trusteeship. It differs radically and radiantly from the material trusteeship of society. In such cases you are a trustee for the dead, for the past—which is, in a very true sense, the non-existent. But all potentially fertile individuals hold a trust for the future which, since it will live, is in a real sense alive, and, since it will be a reality, is a reality—whereas the past only *was* a reality. Many a trust nowadays simply means that the dead hand which, though it was once something, is now nothing, shall be a burden upon the present and the future—which are real. But this supreme trust, the germ-plasm, of which every potential parent is the trustee, is supreme, not only because it concerns the only real wealth, which is life, but also because it serves the only realities, which are the present and the future—unlike not a few monetary trusts which will not allow the dead to bury their dead. Every individual and

every society must choose between the worship of "un-born to-morrow and dead yesterday."

Some such argument as this may appear paradoxical. The past we know: have we not historians? Are there not events which can be called up before us with the utmost vividness—events which "really happened," as we say to a child? We speak of the historical imagination, but very little of this imagination is required. The smallest child who asks for a story has it in superabundance. But the future—what is the future? It neither is, nor has it really happened. Nor do we take seriously those who tell us stories about it—in which, forsooth, we may be wise enough. Yet we only need to consider in order to see that the past, which is not and will not be, is no reality, and that the future—whether we have imagination or not—is certain and living and real. It is none other than the evolution of the present; and we are this present. We regret that we cannot alter the past. Of course we cannot; we cannot alter what is not. We should regret with shame that we have not yet realised our incalculable powers of shaping the future. And since individual man is mortal, future man, of whom the unthinkable myriads are at this hour latent in the living germ-plasm now borne by us who are now alive—*future man is in our keeping. This present germ-plasm is the human race to come*, and it is absolutely at our mercy. What a trust! What an antidote to the words of Macbeth—

"Life's but a walking shadow, a poor player
That struts and frets his hour upon the stage,
And then is heard no more. It is a tale,
Told by an idiot, full of sound and fury,
Signifying nothing."

It is granted, then, that though the germ-plasm is potentially immortal, though it is mankind to be, any individual may put a final term to its age-long

history, so far as the portion of it entrusted to him is concerned, by refraining from parenthood. This is a tremendous power of the individual over the germ-plasm, which even the extremist Weismannian must obviously grant. But are we to admit that the individual has no other power; that he can choose solely between the tremendous alternatives of either passing the race on unimpaired or destroying it outright? This suggestion, supposed by some to be involved in Weismann's great theory, is palpably absurd, and has no reference to that theory properly conceived—as it is, for instance, by its author. Thus one may contract a disease which infects the germ, breeding horrors of every kind. Or one may suffer from lead-poisoning and similarly poison, temporarily or otherwise, the germ-plasm—with corresponding consequences. Or, if one takes alcohol in sufficient quantities, and under certain conditions, the same result will ensue. In such cases, those elements of the germ-cells which are destined to give rise to the nervous system, and especially the highest part of the brain of the future individual, are most seriously injured, in accordance with the general rule that the most highly evolved structure is the most delicate and susceptible. The parent who so treats his trust thus attacks, often to destruction, the highest attributes of man—the very characters which make him human. And the father who thus bestows a germ-cell which he has infected with syphilis leaves nothing undone to make his act the most utter and complete abomination that can be named. Not only is the future blasted and doomed, but the present—the living mother—is herself defiled as an individual and for motherhood, in the very act which confers the possibility of motherhood upon her. This foulest of all foul deeds is perpetrated daily throughout civilisation, and there is in Great Britain no law which takes any cognisance of it whatever.

From our point of view, then, which is the highest that can be named or conceived, mankind at any moment consists of two sections. To one of these belong those who will not be parents. They may or may not have been parents in the past. To this group belong all elderly women, not a few married people, and many unmarried people.¹

So far as the entire future is concerned—a future so prolonged, let us remember, that the whole past of mankind is but as a moment compared with it—the personal morality of the non-parent is of a wholly different order from that of the parent-to-be. He or she who is never or never again to be a parent has no duty to the germ-plasm in his or her keeping. Such a person, then, may or may not use alcohol in abundance—to take a typical and only too familiar case: *it does not matter* how he treats his germ-plasm, since nothing is to come of it. But for those who will be parents, the trusteeship with which all healthy persons are potentially endowed is a real one. They have that in their care from which future mankind will spring. It is theirs to nourish with oxygen and food, or to poison and destroy. Better far that they should allow it to die with them, its purpose wholly unfulfilled, than that they should degrade the fulfilment of that purpose by feeding the portion of the germ-plasm which is entrusted to them with poisoned blood. Such an one must feel that, wherever he goes, he carries with him the future. The lives of those who are to be are in his hands.

Nothing could well be more unfortunate than the erroneous recent idea that Galton and Weismann have released us from the burden of heredity; that the sins

¹ The reader may ask how we can predict whether or not some of these will become parents. That is not, however, a relevant objection at the moment. The point is that, whether we can make predictions or not, there is this division amongst mankind—the most important that can be named.

of the fathers are not visited on the children; that we can do as we please, nor need regret past errors, since nothing that we can do is permitted by nature to injure the portion of the future race which is entrusted to us. This is a half-truth of the most pernicious order. It is true that, shall we say, a life of swindling and selfishness will not endow our children with a greater tendency to such things than they would otherwise have had, just as it is true that their brains will be none the worse—or better—if we have not been “educated.” Such transmissions do not occur and cannot occur; but for the physical health of the germ-plasm which is entrusted to us, for what one may call its *upkeep*, though not its *architecture*, we are certainly responsible. Perhaps the nearest parallel is that of a man to whom is entrusted the care during his lifetime of a wonderful machine which he does not understand, which he did not make, and the principles of the construction of which he cannot alter, nor yet rearrange its parts in any degree. But he can neglect it; he can forget to oil it; he can use bad oil; he can let it rust and—if we conceive this machine as one for the manufacture of men—when next it is set to work, the human product will be defective.

Let not the reader fancy, then, that the theory of Galton and Weismann abolishes responsibility on the part of the future parent. Undoubtedly it reduces that responsibility, so far as its range is concerned; but indeed, if any one had *actively* held the Lamarckian view—as the non-swimmer actively holds the view that if he falls into the sea he will be drowned—how could any one have dared to become a parent in the past? On this theory every moment lost or wasted, every stray thought, every bodily injury—was a sin against the unborn. Those who take this greatest of questions seriously can fortunately repudiate a load of responsibility too heavy for any one to bear. The responsibility

which is actually imposed upon them is relatively light so far as meeting it is concerned, though it is of incalculable importance. We cannot avoid the possibility of accident—say, a broken leg. This, on the popular view—if it were possible for a popular view to be an examined view—would condemn future children to broken bones; unless, indeed, it be supposed that the healing of the bone would save the future child. But plainly, we cannot live in glass cases—we who are to be parents. Nor need we. We do need, however, to know, and to act on the knowledge, that there are certain poisons, some of them, like alcohol, produced by minute forms of life outside the body, others produced by minute forms of life inside the body—such as the poisons of syphilis—which are racial poisons, poisons to the germ-plasm which is in our care, and which we propose to use. The protection of our bodies, and therefore of the undeveloped race which they harbour, from these poisons is quite practicable.¹ It is a dictate of true morality, and the day will assuredly come when it is placed in the very forefront of personal duty *for those who will be parents*. That is not to say that the others may do as they please in, for instance, the matter of alcoholic indulgence, but that their conduct is of infinitely less importance, as they indeed, since they are not to be parents, are of infinitely less importance in all their comings and goings. There is, of course, the obvious protest that a Kant or a Spencer, or a Kelvin or a Galton, is of more importance than many parents; and that is true—for them.

Besides the foregoing, there is also associated with the name of Weismann the theory of “determinants,” “ids,” “idants,” “biophors,” and so forth, concerning which an infinity of criticism is possible. It seems to

¹ Except for the wife, who is at her husband's mercy in this respect, and is often infected, law and medicine and social opinion doing nothing to save her.

the present writer, however, that these two parts of Weismann's work are wholly distinct; the one concerns heredity and the other concerns development. Criticisms upon the latter do not affect the validity of the former, and the problem of development or embryology

The political significance of the new view

is substantially irrelevant to our present inquiry. But Weismann's theory of heredity—that is to say, his theory of the nature of the organic relation between living generations—is indeed not a theory, but a statement of fact, and it is of enormous importance in its bearing upon the controversy as to the transmission of acquired characters. Now the importance of this controversy is incalculable. Says Herbert Spencer: "A right answer to the question whether acquired characters are or are not inherited underlies right beliefs, not only in biology and psychology, but also in education, ethics, and politics;" and again—"Considering the width and depth of the effects which the acceptance or non-acceptance of one or other of these hypotheses must have on our views of life, the question, Which of them is true? demands beyond all other questions whatever the attention of scientific men. A grave responsibility rests on biologists in respect of the general question, since wrong answers lead, among other effects, to wrong beliefs about social affairs and to disastrous social actions."

Spencer's own conclusion, very positively maintained, was that acquired characters are transmissible. Darwin also held this view. Now, both Spencer and Darwin can be quoted again and again in the most positive expression of what we are now learning to call eugenic teaching. Spencer, for instance, speaks of "that general result most detrimental of all, helping the worthless to multiply at the expense of the worthy." He has several invaluable pages on the relations of war to eugenics, showing how in primitive societies

militarism was eugenic in effect, whilst in civilised societies it means the extirpation of physical fitness. Thus the modern Frenchman owes his short stature to Napoleon, and thus "the wars of the Roman Empire rooted out the best, and left Rome to a mob" (Thomson). Thus again, Spencer says ("Study of Sociology," 20th edition, p. 369): "If men who, for a score of generations, had by preference bred from their worst-tempered horses and their least-sagacious dogs, were then to wonder because their horses were vicious and their dogs stupid, we should think the absurdity of their policy paralleled only by the absurdity of their astonishment; but human beings instead of inferior animals being in question, no absurdity is seen either in the policy or in the astonishment."¹

The masterpiece from which these quotations are taken is indeed a eugenic treatise, like certain chapters of Darwin's "Descent of Man." And now we begin to understand why Spencer was right in his estimate of the importance of the controversy regarding the transmission of acquired characters. Possessed as both he and Darwin were with high and never-failing passion for the human cause, both of them would assuredly have devoted their utmost powers to the formulation and propagation of eugenics, had their beliefs on this matter been other than they were.² But so long as men believed that acquired characters were transmissible, education in the widest and best sense obviously offered the shortest road to the goal which we all desire. If the facts of heredity were what Darwin and Spencer supposed, education would retain the unchallenged place

¹ It is amusing and pathetic and interesting to compare the page from which this is taken with paragraphs 122 and 123 of Ruskin's "Time and Tide," which should be read in this connection. Ruskin and Spencer thought very little of each other, just as most of their respective followers do nowadays.

² "The Descent of Man" was published in 1871, and "The Study of Sociology," in 1873.

which so many ages have given it, but it follows—and this point cannot be over-emphasized—from the modern discovery of the limitation of inheritance to the inherent or germinal that *education must be displaced by selection as the supreme instrument of race-progress*. This we must assert and assert again, well knowing that not for many a long year to come will it be realised, much less acted upon. There, however, is the issue, as plainly stated as may be. The more this point is considered the more cogent and universal in its bearing it will appear. Forty years ago Herbert Spencer realised the significance of the controversy regarding acquired characters, and his statement of it is not the less valuable to-day because, as it happens, Spencer's own conclusion was the opposite of that which must now be recognised. Both Spencer and Darwin, notwithstanding their beliefs in the transmission of the results of education, formally and repeatedly enunciated the principle of eugenics. They could not, however, place it in the forefront, since, given their beliefs, it must be inferior to education—because so vastly slower.

The business of the thinking party of the future, then, is evidently plain. Our first task is to teach the public at large that acquired characters are not transmissible. During the six years of the present writer's public activity he has stated this, by voice or pen, on the average about once in a fortnight. So far he has failed to observe any sign whatever that the doctrine is not as novel and surprising to the public in general as it ever was. If anything may be inferred from this, we may conclude that our first task, though plain enough, is no light one.

Many readers will know that quite lately there has been an astonishing development in the study of heredity—the re-discovery and revival of the work done by Mendel, Abbot of Brünna, more than forty years ago. It was at first supposed that this branch of inquiry

was concerned only with the phenomena of hybridism in plants; then, that the animal world at any rate stood outside the Mendelian laws; then, of Mendelism that though they might apply to certain of the lower animals, they had no personal relevance for man. The opponents of the new study have had to abandon successively one and all of these positions, and I may here quote from Professor Bateson of Cambridge, the distinguished leader of the Mendelian school in Great Britain, a passage which cannot too deeply be taken to heart:—

“There are others who look to the science of heredity with a loftier aspiration; who ask, Can any of this be used to help those who come after to be better than we are—healthier, wiser, or more worthy? The answer depends on the meaning of the question. On the one hand, it is certain that a competent breeder, endowed with full powers, by the aid even of our present knowledge, could in a few generations breed out several of the morbid diatheses. As we have got rid of rabies and pleuro-pneumonia, so we could exterminate the simpler vices. Voltaire’s cry, ‘*Ecraser l’infâme!*’ might well replace Archbishop Parker’s Table of Forbidden Degrees, which is all the instruction Parliament has so far provided. Similarly, a race may conceivably be bred true to some physical and intellectual characters considered good. The positive side of the problem is less hopeful, but the various species of mankind offer ample material. In this sense science already suggests the way. No one, however, proposes to take it; and so long as, in our actual laws of breeding, superstition remains the guide of nations, rising ever fresh and unhurt from the assaults of knowledge, there is nothing to hope or to fear from these sciences. But if, as is usual, the philanthropist is seeking for some external application by which to ameliorate the course of descent, knowledge of heredity cannot help him.

The answer to his question is *No*, almost without qualification. We have no experience of any means by which transmission may be made to deviate from its course; nor from the moment of fertilisation can teaching, or hygiene, or exhortation pick out the particles of evil in that zygote, or put in one particle of good. From seeds in the same pod may come sweet peas climbing five feet high, while their own brothers lie prone upon the ground. The stick will not make the dwarf peas climb, though without it the tall can never rise. Education, sanitation, and the rest are but the giving or withholding of opportunity."

Already Mendelism offers precise guidance in the case of certain diseases, such as *præ-senile cataract*; and in a study (unpublished) of the brooding instinct as an inheritable unit in the fowl, it has invaded the psychical sphere on its most important side. It gives precise orders, had we the wisdom to obey them, in many cases. The reader in whose family there is colour-blindness should acquaint himself with the facts of the inheritance of this abnormality. If he be young and his career yet undetermined he should make a point of ascertaining whether or not his vision is normal. The fact may bear directly upon the choice of his life-work. Then, again, there may be *hæmophilia* or "the bleeding disease," as it is called, in the family. The daughter of a *hæmophilic* man, herself showing no signs of the disease—for she merely carries it as an unwitting trustee for her sons—should know that motherhood will bring to her and hers more sorrow than joy. The *hæmophilic* boy rarely lives to maturity, and no more need be said of him. But recent inquiry by the Mendelians both in Great Britain and in America seems to show quite definitely that, in accordance with their expectation, those males of a *hæmophilic* stock who do not themselves show the taint will not transmit it. This is, of course, of the utmost importance for them

in the matter of personal duty. They are free to marry, whilst their sisters are not. The facts are extremely curious and seem anomalous, but to the Mendelian they are so far from being anomalous that they actually illustrate his law.

Most of the hereditary abnormalities or diseases now being made comprehensible by the Mendelians develop, if they are to develop, without the environmental factor being of any moment. But we may at any time ascertain the laws of other diseases or diseased potentialities, the ill effects of which can be controlled, whether by habits of diet, by residence in certain climates, or what not. Thus, even before these words appear in print, it may be that a direct personal service is done to some reader or another if his attention is effectively drawn to the Mendelian studies.

Before we proceed in a final chapter to one or two terrible but inevitable aspects of this subject, just a word must be said as to the remoter aspects of duty which our modern knowledge of heredity now begins to impose upon us. It has to be granted that, so far as the quality of the germ-plasm which each of us bears is concerned, there is an element of fatalism in the modern teaching. Whilst it is to be presumed that attention to the personal health, and thus to the quality of one's blood, will tend to keep one's germ-plasm in good repair, so to say; and whilst it is certain that the introduction of poisons, living or other, into the blood may injure the germ-plasm, yet in the main its constitution, and therefore its potentialities, are beyond the control of the wisest and most conscientious. If, for instance, we are of slow intelligence and learn with difficulty, the utmost studiousness, though it may do much for ourselves, cannot be hoped to improve in any degree the quality of our germ-plasm on this score; and examples might be multiplied indefinitely. There is thus, as has been said,

a quasi-fatalistic element with which the hygienist, as well as the *eugenist*, to coin a word now necessary, must reckon.

Nevertheless, our personal responsibility remains, and finds an abundant sphere in which to exercise itself. In the first place, it is for us to decide whether this germ-plasm, given whatever qualities it has, is or is not to be handed on at all. But though this is a tremendous power—who, indeed, could well ask for more?—it is not all. We cannot select our parents, but we can select our parents-in-law. It is for the individual, whether man or woman, to choose for his or her unborn children one of their parents. Let us, in the first place, consider the manner, absolutely unprecedented in the whole history of life, in which this choice is to be achieved.

The psychology of man is profoundly modified from that of his predecessors. Certain of their characters, however, he retains in full abundance, foremost amongst these being the racial or sexual instinct. But consider what an instinct is. "Instinct," says Professor James, "is the faculty of acting in such a way as to produce certain ends without foresight of the ends." The reader will agree that this definition, framed by one of the foremost of living psychologists, and generally accepted, is as a rule only too lamentably accurate in its description of the exercise of the racial instinct in man. Now the all but audacious proposal of the modern student of human heredity is that since we are human beings, "looking before and after," as Hamlet says, though also instinctive animals, we shall in the future and for the future, defying the nature of instinct, act *with foresight* of the supreme end which the racial instinct exists in order to serve. The reader must not hastily say that this is impossible, for there are not a few happy babies coming into the world nowadays who were desired and loved in anticipation

long before they came into being; and if, as an evolutionist, one is puzzled for some absolute mark which shall distinguish man from all lower species, here surely, in literally provident child-bearing, is what we require to warrant the boast that man is the paragon of animals.

We must, then, take and use this racial instinct, notwithstanding that it possesses in full measure the characteristic of instinct—a faculty for action towards certain ends without foresight of those ends—and we must place before ourselves the ideal of its absolute transmutation, an ideal which, as we have seen, though any observer of our planet until a few hundred thousands of years ago would have regarded it as utterly utopian, and though many will regard it as utopian even to-day, is yet actually realised by some amongst us; and, as Herbert Spencer says, “That which the best human nature is capable of, is within the reach of human nature at large.”

In pursuance of this ideal we have first to recognise the sharp limitation of our personal power over the germ-plasm which we ourselves possess; but, secondly, we perceive that the choice of a mate, though we may be inclined to exercise it solely for our own pleasure, is an act of immense responsibility to the future. We look upon the sexual instinct as somewhat animal, unworthy of the dignity of man. But if we transmute it, using it as the instrument of a self-conscious being for the realisation of the highest ends that can be conceived, then surely it may become, not our shame, but our glory. As intelligent beings we have, or should have, foresight, and it is the provident use of the racial instinct, the nature of instinct notwithstanding, that will some day transform the world.

It does not need, alas, to be pointed out that in all educational systems hitherto we have persistently con-nived to ensure that on no account shall the racial

instinct be made provident, and thus humanised. Our disastrous principle—and in no other direction does prudery exact a greater price—is in almost every instance to ignore the racial instinct altogether, leaving to time and chance and the devil the consequences which may ensue when, like a bolt from the blue, it strikes the boy or girl. In some rare instances we do recognise the racial instinct in its relation to the individual, and may utter warnings; but nowhere, it is probably safe to say, do we take this instinct and associate it in educational practice with our knowledge of the end which it serves.

The time must be nearly at hand, however, when, with the general discrediting, alike in its methods and its ideals, of that process of mental destruction now called education, eugenic education will be regarded as the crowning task of pedagogy—the goal towards which all other education should lead.

THE TRANSMISSION OF CONTAGIOUS DISEASE

HEREDITY is the organic relation between living generations. The transmission of colour-blindness from one generation to another is a case of heredity. What is commonly called the heredity of such diseases as syphilis, however, is not heredity, but infection. That is a necessary biological criticism, but for practical purposes we may and must associate this question with our brief study of heredity in general.

As is now well known in the case of lead, the poison of syphilis may affect the racial elements of which the body is the host, and thus may similarly have racial consequences. These, however, in the case of the syphilitic poison are immeasurably more widespread and serious and certain. Here, again, there is no infraction of the principle of Galton and Weismann that a scar is not inherited, or that you cannot produce tailless rats by cutting off the tails of parent rats. It is a case, not of heredity, but of infection—the exposure of germinal tissues to a poison reaching them through the blood of the individual body which is their host or temporary trustee: in such a case the most dishonest and villainous of trustees. The syphilitic parent is a trustee of the future who betrays this most sacred of all trusts.

There is one point of difference between syphilis and lead, viz., that whilst lead is what we commonly call a chemical poison, the disease called syphilis is the product of a living organism (which has lately been discovered and is now quite well known). The disease, however, is really due to the complex poisons, just as “chemical” as lead is “chemical,” which this minute creature produces. The distinction between the two cases has practical aspects of the utmost moment, no doubt, since, owing to the production of the syphilitic

poison by a living creature which can be transferred from one person to another, the disease is contagious or infectious, whereas lead-poisoning is not. This obviously affects the question of marriage, quite apart from parenthood, and necessitates the discussion of syphilis in detail from this aspect alone. Further, it is to be remembered that the poisoning of a woman by syphilis will mean the poisoning of her future children to the remotest period, unless she be treated adequately. It does not suffice, as in the case of lead-poisoning, merely to remove her from danger. Chronic lead-poisoning involves the repeated introduction of the poison, but the introduction of a living organism, such as that of syphilis, on one occasion only, means in effect the most chronic of poisonings, since the microbe of the disease makes a home and a laboratory of its host, in whom it continuously manufactures its poisons from year to year, thereby poisoning the racial elements of whom the individual body should have been the inviolable host, admitting no such enemy to betray its trust.¹

It is impossible to mention the subject of syphilis without protesting against the shameful and outrageous crime which is perpetrated when a husband infects a wife with this disease. The law which hanged a child of nine in public—on the scaffold he cried for

¹"*Syphilis*.—As this disease appears to be due to a specific microbe, its reappearance in the offspring of syphilitic parents is not strictly a fact of inheritance. The father may infect his offspring without the mother being affected, and it is possible that the microbes may enter the ovum with the spermatozoon. The father may affect his offspring indirectly by first infecting the mother—that is, the microbe may pass through the placenta into the child. In certain cases—*e. g.*, when conception occurs soon after the date of primary disease—the probabilities of the offspring being infected are great, though there is always some uncertainty. Of twins, one may be infected and the other not. But the chances are so many that a patently syphilitic father will have syphilitic, or in some way deteriorated children, that the marriage of a

his mother—four years before Queen Victoria came to the throne, for stealing something worth only a few pence, takes no cognisance of crimes for which, if for any, public execution would be a fitting penalty. It is no business of ours here to discuss the principles and objects and methods of punishment, but the time will assuredly come when posterity looks back upon us, as Ruskin declared that it will, “with incredulous disdain,” for permitting such crimes to go unpunished and even unbranded to-day.

If no words that can be summoned, no words that any language contains, are adequate to express the foulness of such crimes as these, nor even adequate to condemn the callousness of public, if not, indeed, of medical, opinion in regard to them, what shall be said of the transmission of syphilis to the child? The reader is tired, perhaps, of hearing that this or that or the other is a scandal to our civilisation. Here is a scandal so scandalous that it is scandalous to mention it. The decent thing is to be silent about it, which is in effect to countenance it, to permit it, to be guilty for it in the eyes of “whatever gods there be.” There is no question as to the facts, there is no question as to the horror of them. There should be, for indeed there is, no question—and this is perhaps the most horrible fact of all—that public opinion could put an end to them if it chose. And there lies the difficulty of the present writer in this case. There is nothing to argue about, there is nothing material to explain, there is nothing to discover, there is nothing even to

patently syphilitic subject can only be called a crime—the more heinous since the disease in the offspring is often more serious than in the parent. It seems, furthermore, certain in the case of this disease that, apart from the specific antenatal infection of offspring, the toxins produced by the microbes in the body of the parent or parents may induce general disturbance or debility of constitution in the germ-cells, and thus result in inferior offspring.” (Thomson’s “Heredity,” p. 286.)

present in a new light, there is nothing that requires illustration. There is nothing but a crying evil to name, the cry of which is so horrible that we have agreed to close our ears to it. What, then, can one do? What function can be served by putting pen to paper? One is at a standstill. It is useless to present the case, for every one knows the case; it seems almost useless to make quotations from former writers, for every one knows what they have to say and what they have said. It is probably worse than useless to attempt to paint the foul picture again. The problem is not to present it, but to open people's eyes to it. This cannot be done by science. It is not to be done by the creation of a new agency, for we have churches already, we have schools, we have the medical profession, we have the press. If these do not suffice, what agency will?

At least one must say outright what one believes. The subject under discussion is so urgent, so inexcusably neglected, so incalculably pregnant with disaster, that it seems almost wrong to discuss anything else in the present volume lest we should lose our sense of proportion. Unbranded crimes of the most blackguardly description, for which, if we admit the principle of punishment at all, no penalty exacted by any code, ancient or modern, could be too severe, are daily committed—often with the blind blessing of the Church and mutual congratulations, which, in such cases, are appropriate only for the devil and his angels. It is always retorted to the advocate of eugenics—or conscious, provident, and moral race-culture—that he knows little of heredity; that men of genius have no sons, or sons who are fools; that you cannot make Shakespeares to order; or, by other critics, that the love which laughs at locksmiths will laugh at eugenics too. These criticisms are utterly irrelevant to the case of many criminal marriages now accepted by society without a word. We have made only a beginning with

the study of heredity, but we know, and every adult man and woman knows, that there are diseases—some grave, some relatively slight—which are transmitted either with absolute certainty, or with all but absolute certainty. Paternity on the part of a man so afflicted—if not, indeed, marriage without paternity on the part of such a man—is a crime compared with which the ordinary criminal offence is a welcome pleasantry. But we have no imagination. We are like babies or politicians, who can associate cause and effect so long as there is not more than a second or two between them. Let but an hour be required, and they do not see the connection. In the most important of all cases of cause and effect, which is concerned with the continuance of the people—the only wealth of nations—there is required an interval of many months at least, and, indeed, of many years, often amounting to decades, before the seed bears fruit—for the poisoning or the healing of the nations. And so, being babies, and having little imagination, thinking from hand to mouth, we fail to see the connection. We have sympathy. Show us present need, and we will remedy it. Do two deaf-mutes want to marry, and are their means scanty?—we will subscribe, and the devil take the future. Is this a feeble-minded little girl?—we will take care of her, as we should and must, and when she is eighteen off she goes to make room for another. Hence the chronic inebriate and the prostitute, the habitual thief, and the mother of many more such. But if ignorance in action and imagination without taste are as bad as Goethe declared, and if all sympathy depends upon imagination, may we not say that a little imagination is a dangerous thing?—Mrs. Grundy's, for instance, which goes far enough to see that the control of certain forms of disease may remove from what she calls vice the appallingly disproportionate penalty which is often exacted, but is inadequate to make her realise that the

course she prescribes is one of the most fiendish brutality wreaked upon absolute innocence.

Dr. Archdall Reid, with courage for which he is to be honoured, included a chapter on this subject in his book on "Alcoholism." It was really the most needed chapter in the book. Yet only the other day a distinguished doctor said to me, in words which I noted at the time, "Look at Reid: he goes and writes an excellent book, and then spoils it all by putting in a chapter that disgusts everybody:" a pitiable comment on a brave effort. Nevertheless, I will quote from this distinguished student.

He points out that when a disease is contagious—that is to say, requires direct contact for its communication—it is easy to control; just as when a disease is air-borne—such as scarlet fever, measles, chicken-pox, whooping-cough, and influenza—it is difficult to control: for "we cannot disinfect the air." An instance of the controllable and controlled contagious diseases is rabies or hydrophobia; and probably leprosy, which has also been banished from England, should be placed in this category. "The venereal diseases, because as easily controlled as rabies, should be as rare. Nevertheless, the community is ravaged by them." "If a man has small-pox we isolate him; if he comes from a plague-stricken ship we place him under medical observation, but if he has one of the venereal contagious diseases he is free to communicate it to his fellows—perhaps to the child he kisses or to the friend who drinks from his cup. What is the result? . . . Very many Englishmen who reach adult life have suffered from one or more of these complaints; very many innocent Englishwomen are infected also; tens of thousands of helpless infants suffer or perish of them. . . . We bear with a heavy hand on poisoners who work by means of drugs. If a man poisons with arsenic and death results, we hang him by the neck.

. . . But for him who poisons wilfully with venereal disease we have no punishment. We insist merely that he shall do his poisoning in a particularly cruel and treacherous way. Any scoundrel knowingly and wilfully may infect his innocent bride, causing her untold agony or death, and there is no legal remedy. One after another her babies may perish, but, forbidden by our moral code, the law will not stretch that arm which is so powerful against the childish robbers of an orchard. Yet who is there who would not die of laudanum or of prussic acid rather than of this particular poison? Which of us is there that would not take the life of a sister or daughter with his own hands rather than permit her thus to perish." "Not once or twice only have I seen an unfortunate and wholly innocent woman, happy till then in the knowledge of her own beauty, become monstrous, a horror, and an offence against the sun. Not once or twice only have I seen such an innocent one bear a succession of dead or dying children, or children that were better dead than alive."

The chapter from which these quotations is taken is entitled by Dr. Reid, "The Great Procreation Fetish." The subject, as he says, is taboo. Yet procreation is under another aspect parenthood, which, at its best, is the most divine thing we know. Thus conceived, it is not a fetish or false god, the object of a disastrous idolatry, but a true deity which all must reverence. It seems to me that if writers will only follow the terminology which is suggested by the point of view of this book, they may freely discuss, without offence, clamant subjects which are at present treated with silence. The proper fashion in which to attack prudery, I believe, is by taking the high point of view and the language which it dictates. We have paid too great a price for prudery in the past, and we pay it to-day. It orders that we shall teach nothing about

motherhood to our girls, so that when they become mothers, in their ignorance they slaughter their infants by tens of thousands. Hence the workers against infant mortality have had to fight for and obtain a measure which, where adopted, enables us to be informed of the birth of a baby within thirty-six hours. For twenty years we have had that mother to educate: the State has spent large sums of money upon her, and has had her under its eye for years. But all preparation for—even the most distant allusion to—the supreme profession to which she will in all probability be one day called, has been indecent, and therefore taboo. These twenty years having gone, it is now a race for life against time to save her baby from its mother's ignorance. That is our method. Even heavier, perhaps, is the price of prudery in respect of the venereal diseases—a price yearly paid by tens of thousands of ignorant boys in their own persons, by young wives without number, and by their helpless babies—a price paid also by all of us in the support of that enormous number of insane and otherwise helpless persons who are the victims of these diseases. Let us in future speak in terms of parenthood and race-hygiene; let us preach from the supreme text of all human practice, that "there is no wealth but life," and in time we shall be heard.

The reference has been made to insanity. Now there is a disease called general paralysis which for many decades past has become more frequent. It is absolutely hopeless so far as recovery is concerned. It is steadily increasing amongst women. One of the greatest of living students, Dr. Clouston, cites his experience of thirty years. In the first decade 7.5 per cent. of the deaths among women under his care were due to general paralysis, in the second decade the percentage was 9.7, in the third decade it was 12, whilst in the year following that decade (1904) the ratio was 23.5

per cent. Dr. Robert Jones, the Resident Physician and Superintendent of the London County Asylum, Claybury, finds a percentage of 36.5 of the total deaths at Claybury in 1905 to be due to this disease, and he agrees with many other observers that its time of onset after infection is now shorter than formerly. He says: "We are able to say fairly definitely that syphilis is an almost constant antecedent of general paralysis, and yet we all say that syphilis is preventable. Why therefore not prevent it? Whilst conscientious objectors and other faddists make themselves heard, the legislature is silent about infection from this disease, which saps the energy and vitality, not only of the actual victim, but also of many innocent descendants."¹

Particularly significant is the notable increase of this disease amongst women. The clutches of syphilis, as of alcohol, upon womanhood, and therefore upon motherhood, potential or actual, and therefore upon the race—are tightening in our day. If that is the fact, what reader is there anywhere who cannot make the comment and the prophecy, if not the resolve?

One cannot neglect the opportunity to quote from the most recent and careful and authoritative contribution to the racial significance of syphilis.² Dr. Marshall believes that the apparent hereditary tendency to disease of the arteries may sometimes be due to what is somewhat loosely termed hereditary syphilis. Our great authority, Dr. F. W. Mott, declares that, "Of all the causes of insanity, none writes with such a broad and indelible hand as syphilis." Note now the racial significance of this. Says Dr. Marshall:—

"With regard to congenital mental instability, there

¹ "The Evolution of Insanity," Presidential Address to the Medico-Psychological Association of Great Britain and Ireland, 1906 (*Journal of Mental Science*, October, 1906).

² *British Journal of Inebriety*, January, 1908. "Alcohol and Syphilis," by Dr. C. F. Marshall, author of "Syphilology and Venereal Disease."

is no doubt that hereditary syphilis is one of the chief factors in the production of congenital mental defects. Hereditary syphilis may cause arrest of intellectual development, varying in degree from defective intelligence to idiocy; the development of the brain being retarded by thickening of the scalp from syphilitic osteitis, by chronic meningitis, or by atresia of the cerebral arteries.

"Syphilis, of all diseases, is the one most frequently transmitted to the offspring—in other words, one with the most hereditary effects. It is now known that the pathogenic microbe is transmitted from the mother to the fœtus, and there is evidence also in support of direct paternal transmission by the semen. A number of cases have been collected in which syphilis was probably transmitted to the third generation, although it is difficult to exclude direct infection of the second generation.

"In the family history of the insane we often meet with the terms 'insane heredity' or 'an inherited tendency to insanity,' &c. There is no doubt that a large proportion of this is really syphilitic heredity, or perhaps the combined effect of hereditary syphilis and parental alcoholism on the products of conception.

"Alcohol and syphilis thus go hand in hand, and probably form the most disastrous of all pathological combinations. It is well known that a large amount of venereal disease is contracted while the victims are under the influence of alcohol. . . . Here it is alcohol which begins the chapter in pathology. Syphilis follows, and may lead to general paralysis, especially if treated with contempt, or with more alcohol. Worse still, the uncured syphilitic may marry, and transmit the disease to his children, who may become feeble-minded or degenerate in various ways. Here we have the foundation of 'insane heredity,' which in a certain number of cases will lead to alcoholism and insanity.

So the vicious circle goes on—alcohol—syphilis—syphilitic heredity—mental instability—alcoholism—insanity.”¹

Another venereal disease, also contagious, also pre-eminently preventable, is similarly ignored, though it offers abundant opportunities, which are abundantly taken, for the blackguardy infection of wives at all stages in the reproductive cycle. There is no question here of heredity in the strict biological sense of the term, but this disease furnishes the means by which many mothers, themselves morally innocent, themselves victims, infect the eyes of their equally innocent but still more terribly victimised babies in the act of birth—at the very moment when the child’s eyes first open upon the light. This is the chief cause of blindness in this country, and probably in all vaccinated countries. (It is surpassed by small-pox in this respect in an unvaccinated country such as Russia, and was surpassed by small-pox everywhere a century ago.) According to a recent high authority, “among pupils in schools for the blind, who are usually under twenty years of age, we find that about thirty per cent. have lost their sight from this cause.”²

There are, of course, many other causes of blindness, but venereal disease of an absolutely preventable character, which might be, should be, and in an educated and decent age will be, unknown, is the chief cause of all blindness, and practically the only cause of what is called congenital blindness—the word “congenital” being used for once accurately, since this is blindness dependent upon disease contracted at the moment of birth. We read that the Founder of Christianity saw “a man which was blind from his birth.

¹ The reader should acquaint himself with the brave and terrible play of Brieux. *Les Avariés*.

² *Encyclopedia Medica*, vol. i., p. 511.

And His disciples asked Him saying, Master, 'who did sin, this man or his parents, that he was born blind?' The pathetic legends that we see upon the streets of any great city, even if we have never paid a visit to an institution for the blind, should remind us of this incident. The answer to the question is that the victim did not sin, that the mother did not sin, that the father proximately sinned. Ultimately this awful calamity lies, however, at the door of society, itself afflicted with moral blindness of its own making. It is a monstrous thing that in this present age any baby should come into the world in any civilised country to receive, at the very moment when first it opens its eyes to the light of day, the wholly preventable infection which will blind them to that light forever.

We have now come to the end of our brief study of the principal conditions of health, strength, and happiness. The maintenance of good brains has been our object throughout, and in so far as we have forgotten it, in so far we have fallen beneath the proper level of a work on human hygiene, whatever may or may not be the proper level of a work on, shall we say, hippopotamus hygiene. In the last chapter or two we have endeavoured to recognise those given and largely inevitable conditions of inheritance with which every system of personal hygiene must reckon, and of which more and more will be heard in the near future.

By "health" we have tried to mean health of mind and brain. As for health of body, that is worth attaining exactly because it is the necessary condition, or almost the necessary condition, of mental health. All human hygiene worthy of the name is in the long run the hygiene of mind.

By "strength" we have tried to mean vitality, energy, power of endurance and resistance, of adaptation, and

of unlimited mental growth. It may be left to those who are unacquainted with the merest rudiments of any relevant science to confuse strength with muscularity and to fancy that it can be estimated in foot-pounds.

"Happiness" is a fine word, notwithstanding the scorn poured upon it by the opponents of the Victorian utilitarians. It is the fruit of many parents. A mere belief, true or false, may generate and maintain it in a body that is a mere breeding-ground of microbes. Let this be candidly admitted, and when we speak of infectious disease let us not forget disease of the emotions; nor, in our study of hygiene, must we forget that mental health is fortunately most infectious too. But in the main we have been concerned with material things, and that quite legitimately. Perhaps it is not necessary to repudiate any suggestion that the writer regards the material point of view as complete in itself. When we come to study the building up of body and mind in childhood—really a much more hopeful if not more useful task than their maintenance in us of this generation, whose early education has left us in too many cases past praying for—we shall learn to what an astonishing extent the individual human mind is a social product, the fruit of the influence of imitation and suggestion upon inherited instincts; and shall thereby learn to what a great extent modern psychology empowers us, if we be only wise enough to use her implements, to put the material in its necessary but humble place, and to recognise that man is not only a mind, but in very large measure a product of mind, for we are parts of all that we have met, and we are known by the company we keep because we are in large measure products of that company.

INDEX

- ABDOMEN**, the clothing for, 74
 —exercise of, 100, 287
Abdominal wall, the, description of, 75
Adaptability, human, 11, 26, 60, 61, 102, 103, 121, 186, 229
Adenoids, results of, 343
 —source of infection, 343
Advertisements of patent medicines, 144, 146-150
Air, liquid, 37
 —as food, 228
 —bad, effect of, on the lungs, 231
 —fresh, its artificial creation, 37
 —night, long standing mistrust of, 30
 —night, its properties, 36
Alcohol, 66, 117, 136, 139
 —failure of, as a drug, 136, 137, 168, 173
 —in the treatment of pneumonia, 157
 —relation of, to infectious diseases, 158
 —and hydrophobia, 158
 —action on phagocytes, 156, 158
 —and fever, 160, 182
 —action of, on the brain, 161
 —and motoring, 163
 —a destroyer of self-control, 164
 —a false stimulator of the wits, 164
 —and the social sciences, 167
 —and crime, 167
 —and life insurance, 167
 —food value of, 168-172
 —the consumption of, legislation to check the, 168
 —chemical composition of, 170
Alcohol, action of, on the stomach, 175
 —action of, on the digestion, 174
 —action of, on the heart, 175
 —action of, on the blood, 176
 —in fainting, 175
 —a cause of stoutness, 177
 —and the warmth of the body, 179
 —a cause of pneumonia, 180, 277
 —and meat, 182
 —a cause of tuberculosis, 183
 —and the State, 199
 —and the racial instinct, 360, 361
 —and childhood, 361
 —and syphilis, 393
 —and insanity, 393
 "Alcohol, The Influence of, and Other Drugs on Fatigue," by Rivers, 188
 "Alcohol, the Sanction for its Use, &c." by Starke, 189
 "Alcohol and Syphilis," by Dr. C. F. Marshall, 392 *n.*
 "Alcohol and the Human Body," by Horsley and Sturge, 188
 "Alcoholism," by Sullivan, 188
 "Alcoholism," by Dr. Archdall Reid, 389
Anæmia, 29
Anti-toxin, 138
Appendicitis, commonest among young men, 282
Appetite, fresh air as a cause of, 36
 —the guide to diet, 235, 238, 303
 —the education of the, 238
 —variations of, 239
 —of children, 240

- Army, British, harmful drill regulations of the, 88
 Arnica, misconception as to the value of, 136
 Arteries, the health of, the criterion of age, 312, 315
 —the, how to keep young, 313
 Arterio-sclerosis, prevalence of, 308
 —results of, 308
 Asceticism, the merits of, 14
 —and sleep, 108—
 —the new and the old, 14, 85, 235, 357
 "Autobiography," the, of Herbert Spencer, 21, 326
 "Avariés, Les," by Brieux, 394 *n*

 BACK, pains in the, 146
 Baldness, hard hats a cause of, 52
 —immaterial, 295
 Barley and barley-water, 223
 Bath, the cold, merits and demerits of, 291
 —the warm, merits of, 291
 —the Turkish, 290
 Beauty, facial, inconsequence of, 292
 Bed-clothes, 116
 Bedrooms, separate, for married people, 115
 —ventilation of, 116
 Beds, right and wrong position of, 36
 —single preferable, 116
 —width of, 116
 Beer, pure, 209
 —schoolboys and, 199, 361
 Biscuits, value of, 217
 Bleeding coming into vogue again, 269
 Blindness, congenital, 394
 —small-pox as a cause of, 394
 Blood, as a blood-making food, fallacy about, 250
 —pressure, high, dangers of, 314
 Body, the, subservient to the mind, 16, 172
 Body, of longer life than the mind, 18
 —its normal temperature the same for all climates, 60, 61
 —exists primarily for the cells, 343
 Boots, American, 81
 —how they should be made, 81, 82
 —evils of tight, 52, 53
 Bowels, best time for action of the, 104, 105, 284
 —education of the, 283, 285
 —hypnotism and action of the, 283
 —frequency of action of the, 283
 Boyhood and puberty, 346
 "Bradyfagy," 279
 Brain, creation of, 22
 —the, maintenance of, 22, 23
 —should rest during sleep, 104
 Bread, its economic value, 213, 214, 215
 —*versus* meat, 213
 —germ, 216
 —most wholesome colour for, 216
 —brown *versus* white, 216, 217
 —how to eat, 218
 —crusts *versus* crumb, 216
 —new *versus* stale, 218
 —and politics, 219
 "Bread Reform League, The," 218
 Breakfast, appetite for, 36
 —temper, the, 114
 Breathing through the nose, 71
 —correct, 38, 39, 72, 73
 —normal, 74
 —deep, importance of, 90, 100
 Breeding, systematic, influence of, on the human race, 378
 Bright's disease, 288
 "British Journal of Inebriety, The," 162, 182, 185, 392 *n*.

- Bunions, prevention and cure of, 81, 82
- CAFFEINE, 193, 194
- Carbonic acid, its hypnotic influence, 37
—less in the blood during sleep, 104
- Caries, dental, caused by microbes, 296
—prevalence of, 297
- Cats, 120
- Celibacy, 348
- Chapping, defective drying the cause of, 293
—remedies for, 293
- Chauffeurs, total abstainers, 164
- Chess, mental recreation, 98
- Chest protector, absurdity of the, 70
- C h e w i n g , importance of, thorough, 245, 246
- Child-bearing, foresight in, 382
- Childhood, its need of sleep, 107, 112
—the mind of, 316
- Children, the society of, 317
—rejuvenating power of, 317, 318
- China tea, 194
- Christian Science, 12, 101
- Church bells, 119
- Claybury Asylum, 392
- Clock, the tyranny of the, 115
- Clocks, striking, 119
- Clothes, the origin and evolution of, 50
—the functions of, 51
—relation of, to food, 51, 52
—material of, 52
—tight, and their results, 52, 53, 54, 74
—must be absorbent, 55
—harbourers of germs, 58, 59
—for hot weather, 62,
- Coal, the misuse of, 49
- Cocoa, food value of, 198
- Coffee and insomnia, 117
—as a stimulant, 161, 202
—use of, 196
- Coffee, how to make, 197
- "Cold, catching," 29, 30
- Collars, 68, 69
- Coma, 110
- Constipation, 76, 100
—causes and prevalence of, 281, 282
—results of, 282
—and diet, 287
—and drugs, 285
- Consumption, bad air as a cause of, 27
—extermination of, by ventilation, 29
—treatment of, 30, 72
—superstition about, 29, 313
—as a cause of death to cricketers, 35
—early location of, 72
—noise of cities an indirect cause of, 119
—propagated by the public-house, 184, 185
- Continence does not prejudice potency, 349
- Cooking, 261
of meat, 261
- Corsets, evils of, 53, 77
- Cosmetics, injurious results of the use of, 293
- Cretinism, 138, 142
- Cricket and cricketers, references to, 35, 94, 249, 280, 304, 311, 312, 313, 316, 328, 346
- Cures, recondite, the passion for, 41, 42
- "Cycle of Life, The," by Dr. Saleeby, 153 *n.*
- DAY-DREAMING, 110
- Daylight character of, 330
- Daylight-saving, advantages of, 329
- Deafness, causes of, 336
—treatment of, 341
—quacks and, 341
- Death, premature, 18
- Dentifrice, its composition, 300
- Dentistry, the best the cheapest, 297

- Dentists, American, reason for their superiority, 219
 "Descent of Man, The," 376, 376 n.
De Senectute of Cicero, 323
 Diet, the conflict of, 226
 Diets, ideal, 241
 —mixed, the best, 261
 —vegetable, 262
 Diets, dangers of excessive and insufficient, 266
 — for constipation, 287
 Digestion, gastric, duration of, 10
 —should rest during sleep, 104
 —to what extent aided by alcohol, 174
 —the part of the mouth in, 246, 247
 —the processes of, 248
 —and introspection, 249
 Diphtheria, the anti-toxin treatment of, 138
 Dirt of towns, 69
 Diseases, fewness of, 139
 Distemper for walls, 47
 Doctors, characteristic treatment of, 125
 —and drugs, 125
 Dogs, 120
 Draughts of air, 32
 Dreams, 110, 111, 116
 —day, 110
 —waking, 112
 —visual, 118
 —auditory, 336
 "Drink Problem, The," by fourteen medical authorities, 183, 188
 Drinking, the good of, 289, 290
 Drugs, patent, evils of, 131-132
 —the history of, 132, 133
 —vegetable, the failure of, 144
 —mineral, 135
 —animal, 137
 —the relevance of, to human disease, 138
 —the future of, 141
 —and constipation, 285
 Drying, defective, the cause of chapping, 293
 Dumb-bells, 92, 94, 96, 99
 Dyspepsia. *See* Indigestion
 EAR, its construction, 341
 Ear-lids, artificial, 119, 336
 Ear quack, dangers of the, 341
 Eating, when undesirable, 241
 —correct, 245
 —slower, less food, 270
 "Economic nutrition," 271
 Education, the evils of present-day, 317, 324
 —the results of, not transmissible, 376, 377
 —mental destruction, 383
 —eugenic, 383
 —racial, the disastrous neglect of, 391
 "Education," by Herbert Spencer, 50, 86, 93, 94, 238
 Emotion, definition of, 99
 —pleasant and unpleasant, a cause of insomnia, 123
 Emotions and eating, 242
 Eton jackets, 70
 Eugenic education, 376, 383
 Eugenics, Spencer and Darwin on, 375
 —Education Society, The, and the social "evil," 364
 "Evolution of Insanity, The," by Dr. Robert Jones, 392
 Exercise, the value of, 76, 87, 290
 —effect of, on the heart, 88, 89
 —effect of, on the lungs, 90
 —effect of, on the liver, 90
 —outdoor better than indoor, 91
 —natural better than artificial, 92-94
 —unconscious, the value of, 94
 —relation of, to food, 96-99
 Eye, secondary purpose of, 326
 —the marvellous mechanism of, 333
 —danger of gonorrhœa infection to, 335

- Eye strain, causes of, 325, 330, 362
- FACTORY Commission, the, 27
- Fat, the merits and demerits of, 304-306
- Fatigue and eating, 241, 242
- Feather beds, evils of, 58, 116
- Feet, cold, 79
 ———tight boots a cause of, 53
 ———warm, 118
- Fever, modern treatment of, 178
 ———a symptom, not a disease, 181
 ———Malta, 211
 ———cold water and, 233, 267, 268
- Finsen light treatment, the, 43, 47
- Fish, of equal food value to meat, 262
 ———the most digestible kind of, 262
- Flannel, as a clothing material, 54
- "Fletcherism," 243, 244, 276, 277, 299
 ———and the bowel, 281, 282, 283
- Fluid, all food assimilated as, 245, 246
- Fog, 39, 49
- Food, in relation to clothes, 51, 52
 ———the kind of, relative unimportance of, 190
- "Food and the Principles of Dietetics," by Dr. Hutchison, 195, 264
- Food, solid, the passion for, 205
 ———the cheapest, 213, 214
- Food as fuel, 273, 274
 ———poisoning, chronic, 23, 273, 278, 279
 ———stuffs, the production of, subservient to politics, 222
- Foot, arch of the, 79
- "Force," 220
- Fruit, necessity of, 287
- Fuel-food, the disposal of, by the body, 274, 275
- Furniture, useless, 45, 46
- GAMES, as exercise, 94
 ———ball, 95, 316
- Garters, evils of, 52, 78
- General paralysis, 391
- Germ-cells, the relation of, to the body, 344
- Germ-plasm, the human control over, 368, 371, 382
- Glaucoma, 334
- Golf, its merits, 94, 95
- Gonorrhœa, and blindness, 335, 394
 ———alcohol an ally of, 361
 ———and sterility, 362
 ———inter-sex contagion by, 362, ———and women, 363
- Gout, 79
- "Grape-nuts," 220
- Gymnastics, 99, 100
 ———Herbert Spencer on, 93
- HABITS, formation of, 10, 13
- Hæmophilia, 379
- Hair, ornamental value of, 64
 ———destroyed by hats, 293
 ———preservation of the, 294
 ———the colour of the, 295
 ———grey, 312
- Hallucinations, lack of sleep a cause of, 108
- "Hamlet," quoted, 381
- Handkerchiefs, as germ carriers, 59
- Happiness, the best tonic, 93, 94
 ———human, 396
- Hats, ornamental, not useful, 65
 ———tight, evils of, 66
 ———unnecessity of, 67
 ———destroyers of the hair, 293
- Head, importance of washing the 65, 66, 67, 293, 294
 ———covering for the, 67
- Health, human definition of, 395
- Heart, effects of excessive exercise on the, 88, 89, 98

- Heart, effect of sleep on the, 103
 Heels, 79
 Heels, rubber, 80
 —protection of the, 80
 —high, evils of, 80
 Heredity and environment, 366
 —the power of, 366
 —influence of environment on, 367
 —better than culture, 296
 —contagious diseases and, 384
 "Heredity" by Prof. Thomson, 386*n*.
 Herrings, best and cheapest fish food, 262
 Hæmorrhoids, 281, 286
 Homœopathy, 267
 Hydrophobia, alcohol and, 158
 "Hygiene of Mind, The," by Dr. Clouston, 128, 188, 323
 "Hygiene of Nerves and Mind," by Forel, 188
 Hypnotics, 126, 131
 —artificial, 105
 —natural, 105, 127-128
 —the dangers of, 142
 Hypochondria, 9
 —and sex, 350, 351
 "IMMORTALITY of the germ-plasm," the, 368, 370
 Indigestion, a common cause of insomnia, 105, 116, 124-125
 "Influence of Alcohol and Other Drugs on Fatigue, The," by Rivers, 188
 Inhaling, the, of tobacco smoke, 200
 Insanity, syphilis a cause of, 392
 Insomnia, caused by irregular sleep, 109
 —by heat, 118
 —by light, 118
 —by noise, 119
 —by emotion, 121, 123
 —by indigestion, 105, 124-125
 Insomnia, by caffeine, 196
 —treatment of, by drugs, 125
 —philosophic treatment of, 129, 130
 Internal secretion, the principle of, 358
 Introspection, the evils of, 249
 Invalids, crime of waking, 113
 JAPAN, use of milk in, 211
 Japanese, the, their furniture, 46
 "John Brown's Body," 339
 "Journal of Mental Science, The," 392*n*.
 KIDNEYS, the, 288
 —at rest during sleep, 104
 Knees, the, 77, 78
 "Kubla Khan," 161
 LAMARCKIAN view, the, of transmission, 373
 Larynx, care of the, 342
 Lead poisoning, 384, 385
 Leucocytes, the, description of, 154
 —function of, 155
 —in action, 156
 Light, as food, 231
 —the source of energy, 232
 —influence of, on the skin, 43
 —action of, on the pupil of the eye, 331
 —artificial, the ideal, 329, 330
 —soft character of, 330
 Listerism, 276
 Liver, the, effect of exercise on, 90
 Lungs, the, health of, 73
 —effect of exercise on, 90
 —effect of sleep on, 104
 Lupus, light treatment of, 43
 47
 "MACBETH," quoted, 370
 Maize, 222

- Malaria, derivation of the name, 34
 —cause of, 34
 Malta fever, 211
 "Man is as old as his arteries, a," 306, 308
 Man, his desire to be conspicuous, 68
 Mankind, the adaptability of, 11, 12, 26, 60, 61
 Man, adaptability of, 229
 —various diet of, 229
 "Marriage and Disease," 359*n*
 Mastication, importance of, 245
 —use of, 245
 Meals, rest after, 249
 —solitary, 243
 —reading at, 244
 Meat, delusions about the virtues of, 252
 —the trend against, 257, 264, 271
 —and uric acid, 259
 —how often to eat, 261
 —the cooking of, 260
 —raw, the most digestible, 261
 —diet, effect of, on rats, 257
 —influence of, on the thyroid gland, 259
 —increase of, 261
 —extracts, Liebig's dictum on, 255
 —delusion about, 252
 Medical opinion, changes in, 267
 Medicines, patent, 143
 —cost price of, 144
 —merits and demerits of, 145
 "Meistersinger, Die," 340
 Mendelism, the meaning of, 378
 —and certain diseases, 379
 Middle-age, the producer of the best work, 306, 307
 Milk, the ideal human food, 204
 —powdered, 205
 —the only natural food, 206, 255
 Milk, impure, 209
 —dilution of, 209
 —for adults, 210
 —and tuberculosis, 211
 Mind, of shorter life than the body, 18, 19
 —youth, persistence of the, in age, 308
 —and muscle, 311
 —death of the, 322
 Minds, young and old, 316
 Motoring and alcohol, 163 164
 Mouth-breathing, causes of, 39
 Muscle, the cult of, 84
 —disadvantages of, 85
 Muscle tissue, as muscle-making food, 250
 Muscular exercise, by-products of, 87
 Music, uses of, 337
 —as a healing power, 337
 —hygienic, and unhygienic, 338, 340
 "Music-hall mind, the," 309
 Myopia, modern, 327
 —advantages of, 327
 —causes of, 327, 328
 —among children, statistics of, 328
 NARCOTICS, 124
 "Nature of Man, The," by Metchnikoff, 352
 Neptune, the discovery of, 276
 Neuralgia, bad teeth, a cause of, 298
 Neurasthenia, a quack remedy for, 147
 Nicotine, 199
 Nightmares, 111
 Noise of cities, 118
 —an indirect cause of consumption, 119
 —a cause of insomnia, 119
 —of London streets, a French opinion on, 120
 Noise of motors, 120
 —of cats, 120
 —of dogs, 120
 —a cause of deafness, 336

- Noisy toys, children and, 337
 Nose, the, breathing through,
 38, 343
 —the, function of, 38
 Nursing of children, influence
 of a meat diet on the, 257

 OATMEAL, 215
 —and the physique of the
 Scot, 221
 Oats, 221
 —"Quaker", 221
 Obesity, not necessarily caused
 by over-eating, 305
 Oculist, advisability of consult-
 ing a qualified, 334
 Old agesynonymous with chron-
 ic food poisoning, 280
 —Dr. Keith on, 323
 —Dr. Clouston on, 323
 Old Testament, the, 237
 Optimism, the value of, 320
 Optician, danger of consulting
 an, 334
 Organisation of the body, the,
 248
 Over-eating, 83, 87, 96, 269
 —the results of, 269
 —most prevalent in summer,
 303
 —"John Bull" typical of 304
 —not always a cause of obe-
 sity, 305
 —a cause of arterial degenera-
 tion, 307
 —a cause of senility, 312
 Over-work, effect of, on sleep,
 121, 122
 Oxygen, the use of, 37
 —the means of supplying,
 37
 Ozone, 37

 PARENT-HOOD, rejuvenation by,
 318
 —when a sin, 369
 —when a duty, 369
 —the power of, a trust,
 372
 Patent medicines, 281

 "Pennsylvania Society for the
 Prevention of Social Disease,"
 objects of the, 364
 Peppermint, a cure for the
 smoking habit, 203
 Perpetual youth, the secret of,
 319
 Perspiration, the odour of, the
 cause of, 289
 —a cleansing agent, 289
 Pessimism, the evils of, 320
 Pharmacology, the future teach-
 ing of, 141
 Plants, function of, as oxygen-
 ators, 37
 "Plea for a Simpler Life," by
 Dr. Keith, 117*n.*, 266, 269*n.*
 Pneumonia, the cause of, super-
 stition about, 30
 —alcohol in treatment of, 158
 —alcohol a cause of, 180, 277
 Politicians, the value of, 302
 Politics and food, 222
 Pornography, 353
 Porridge, the decline of, as the
 Scotsman's food, 258
 —and the thyroid gland, 259
 Premature death, 310
 Print, the best for reading, 333
 "Proceedings of the Royal So-
 ciety of Edinburgh." 257
 "Prolongation of Life, The,"
 by Metchnikoff, 278
 Proteid, necessity of, to the
 body, 228
 —amount of, necessary, 272
 —diet, low, results of, 276
 —food, the disposal of, by
 the body, 274, 276
 Prudery, the curse of, 346, 383,
 390
 Puberty, the phenomena of, 346
 —influence of, on the savage,
 353
 Public-house, the, a spreader
 of consumption, 184, 185
 "Putting on flesh," 305

 QUACK, and the racial instinct,
 349

Quack, and venereal disease, 316
 "Quick lunch," the, 244
 Quinine, the cure for malaria,
 134, 137

RACIAL desire, activity the an-
 tidote for, 356

—function, exercise of the,
 unnecessary for its preserva-
 tion, 350

—health, 351

—instinct, the development
 of, 345

— —the, strength of, 347

— —evolution of, 347

— —foresight in the use
 of, 381

— —danger of ignoring,
 383

—organs, the, make the man,
 350, 358, 359

—poisons, 374

Railways, the noise of, 119

Reading in bed, 117

Recreation is exercise, 96

Regent Street shops, their in-
 sanitary condition, 27

Respirator, the, 38

Rest, to what extent a substi-
 tute for sleep, 105

Retrospection, evils of, 321

Rice, how to cook, 224

"Roast beef of Old England
 party," the, 252

Rowntree's, Messrs., Cocoa
 Works, 331

SALIVA, its use in digestion, 248

"Salome," Strauss's, 340

Sand-bags, evils of, 30

Sarsaparilla, the failure of, 136

"Sartor Resartus," 50

"Saul," Browning's, 338

"Savage Childhood," by Dudley
 Kidd, 355

Scalp, ventilation of the, 38

Schoolrooms, defective light-
 ing of, 332

Sea water, why it does not
 give cold, 30

Selection, the supreme instru-
 ment of race-progress, 377

—human, Spencer on, 375

—of a child's parents, 381

Self-control, destroyed by al-
 cohol, 164

Senility, skin deep, 312

—causes of, 312

Sex and hypochondria, 350

—the transmutation of, 354,
 356, 357, 382

—the source of the higher
 activities of man, 354, 356

"Sexuelle Frage, Die," by For-
 el, 353

Shirts, flannel, 69

Short-sight. *See* Myopia

Singing, a preventive of con-
 sumption, 90

Skin, excretory function of, the,
 288

Sleep, the tyranny of, 15

—importance of, 102

—ignorance of the causes of,
 102

—the function of, 103

—rest of the organs and
 senses during, 103-106

—and childhood, 107

—and the children of the
 poor, 107

—lack of, cause of hallucina-
 tions, 108

Sleep, irregular, a cause of in-
 somnia, 109

—good and bad, 110

—normal, 110

—early hours of, most val-
 uable, 112

—and mental work, 115

—and physical work, 115

—how to induce, 116

—effect of over-work on, 121

—and old age, 128

Sleeplessness. *See* Insomnia

Small-pox, a cause of blindness,
 394

Smell, the function of, 57

—the sense of, 343

Smoking, juvenile, 201

Smell, 230

- Smoking and the heart, 201
 —how to control, 202
 —blind men and, 203
 Soap, presence of alkali in, injurious, 293
 "Social evil, the," 352
 "Social Psychology," by Dr. Mac-Dougall, 360
 Socks, 78
 Soldiers, automatic machines, 88
 Solid food, the passion for, 205
 Sponges, evils of, 292
 Starch, "white mud," 68
 "Starving doctor," the, 267
 Stockings, 78
 Strength, human, definition of, 395
 "Study of Sociology," by Herbert Spencer, 376, 376*n.*
 Sugar, food value of, 170
 —children and, 234
 —dislike of, the result of vitiated taste, 276
 Surgery, antiseptic, 140
 Swimming, as exercise, 97
 Syphilis, 136, 371
 —transmission of, by contagion, 384, 392
 —and marriage, 384-385 *et seq.*
 —a cause of insanity, 392
 "Syphilology and Venereal Disease," by Dr. C. F. Marshall, 392 *n.*
 "TANNHAUSER," 340
 Tannin, action of, 193, 194
 Tartar, as a protector of the teeth, 300
 Tea, 117
 —composition of, 193
 —how to make, 195
 —consumption of, 196
 —China, 195
 Teeth, the part of, in digestion, 246
 —good use of, results of, 248
 —the care of, 300
 —and the tooth-brush, 299
 Teeth of children, statistics concerning, 301
 —the question of, in Germany, 302
 —artificial, merits and demerits of, 246
 —decayed, a source of infection, 296, 301
 —a cause of blood-poisoning, 298
 —a door to microbes, 298
 —modern, the decadence of, 298
 Temperature of the body, 60, 61
 Therapeutics, the new, 138, 142
 Thyroid gland, influence of foods on the, 259
 "Till Eulenspiegel," 340
 "Time and Tide," Ruskin, 376*n.*
 Toast, value of, 217
 Tobacco, amount of nicotine, in, 199
 —inhaling the smoke of, 203
 —a poison, 200
 —chewing, 201
 —changing one's, 203
 Toe-nails, ingrowing, 82
 Toes, the, 81, 82
 Tonsils, large, results of, 343
 "Too old at forty," 310
 Tooth-brush, the, criticised, 296
 —unnecessary to the savage, 299
 —how to use a, 299
 Touch, the sense of, 343
 Transmissibility, non-, the, of acquired characters, 373
 —Galton on, 372, 384
 —Weismann on, 372, 375, 384
 —Spencer on, 375, 376, 377
 —Darwin on, 375, 376, 377
 "Tristan und Isolde," 340
 Trousers, 70
 Tuberculosis, bad teeth and, 298. See also *Consumption*.
 ULTRA-violet rays, the antiseptic value, of, 43

- Uric acid and meat, 259
 Urine, colour of, not a cause for anxiety, 288
- VARICOSE veins, caused by garters, 52
- Vegetable kingdom, antagonistic to the animal kingdom, 133-136
- Vegetable proteid, 264
- Vegetables, the necessity of, 262
 —difficulty of digesting, 263
- Vegetarianism, 250
 —the drawbacks of, 262
- Venereal disease, 361
 —control of, 389
- Ventilation by windows, 33
 —by chimneys, 33
- Veronal, 127
- Vitality, not a question of muscle, 101
 —greater in women than men, 101
- Voice, care of the, 342
- Voice-specialists, 342
- WAISTCOATS, 70, 74
- Waking, normal, 112
- Walking, the merits of, as exercise, 97
- Wall-papers, colour and pattern of, 46, 47, 332,
- Washing, importance of, overrated, 289
 —internal, 289
- Water, drinking, dangers of, 208
 —filtering, 208
- Wheat, the future of, 219
 —successive crops of, 220
 —the products of, enumerated, 220
- "Wheat, Shredded," 220
- "Wheat Problem, The," by Sir William Crookes, 224
- Whisky, 209
- "Will-power," 202
- Windows, ventilation by, 33, 36, 336
- Women, of greater vitality than men, 101
 —longer lived than men, 101
- Work, mental, and sleep, 115
 —physical, and sleep, 115
 —at night, 117, 122-123
- Worry, the negation of rest, 106
- "Worry," by Dr. Saleeby, 337
- YOUTH, perpetual, the secrets of 319

INDEX OF NAMES OF PERSONS MENTIONED OR QUOTED

- ABBOT, 158
 Allbutt, Prof. Clifford, 314
 Aristotle, 278

 BACH, 339, 340
 Barnes, Prof. Earl, 309
 Bateson, Prof., 378
 Baudron, 184
 Beethoven, 235, 339, 340
 Biffen, Prof., 220
 Bordet, 159
 Brahms, 340
 Brioux, 394*n*.
 Browne, Sir Thomas, 163
 Browning, Robert, 321, 338
 Brunton, Sir Lauder, 203, 219
 Buffon, 20*n*.
 Burke, 140

 CADBURY, Mr., 198
 Cakebread, Jane, 167
 Carlyle, 50, 225,
 Chittenden, Prof., 235, 256, 264,
 265, 271, 272, 278, 279
 Church, Prof., 217
 Cicero, 323
 Clayton, 44
 Clouston, Dr. T. S., 128, 188, 283
 323, 391
 Cohn, 329
 Coleridge, S. T., 161
 Crichton-Browne, Sir James, 271
 Crookes, Sir William, 219, 224
 Crowley, Dr. Ralph, 184

 DARLING, Grace, 35
 Darwin, 30, 61, 68, 81, 293, 333,
 375, 376
 Davies, Dr., 185,
 Delearde, 158
 Dewar, Sir James, 37

 Dickinson, Dr., 183
 Disraeli, 12
 Dukes, Dr. Clement, 361
 Duncan, Miss Isadora, 325

 ECCLES, W. M'Adam, 162
 Edison, Mr., 270

 Flammarion, 44
 Fletcher, Mr. Horace, 235, 256,
 270, 271, 272, 276, 277, 279
 Forel, Prof. August, 188, 320,
 323, 353
 Foster, Sir Michael, 271

 GALILEO, 10, 278
 Galton, Francis, 310, 373, 374,
 384,
 Gluck, 340
 Goethe, 309, 356, 388
 Goodfellow, Dr., 214
 Gould, Dr., 326

 HAGGARD, Rider, 318
 Hall, Prof. Stanley, 354
 Handel, 340
 Harte, Bret, 48*n*.
 Hawkesley, Messrs., of Oxford
 Street, 336
 Helmholtz, 333
 Hippocrates, 268*n*.
 Hobbes, 313
 Holmes, Oliver Wendell, 131
 Horsley, Sir Victor, 188, 189,
 360
 Hutchison, Dr., 195, 197, 198,
 215, 218, 264, 271
 Huxley, 168, 310
 Hyslop, Dr., 120

 JACKSON, Dr. Hughlings, 165

James, Prof. W., 381
Jones, Dr. Robert, 392

Kant, 374
Keith, Dr. George, 117, 130, 266,
267, 323
Kelvin, Lord, 310, 374
Kidd, Mr. Dudley, 355
Koch, 211
Kraepelin, Prof., 161, 163, 164,
189

LAITINEN, 158
Liebig, Baron, 255
Locke, John, 32, 325
Lucretius, 368

MACBETH, 370
Marshall, Dr. C. F., 392
Massart, 159
Mendel, Abbot, 220, 377
Metchnikoff, Prof., 85, 141, 155,
156, 157, 158*n.*, 163, 176, 189,
238, 278, 279, 280, 282, 315,
352
Mill, John, Stuart, 356
Milton, 139
Mosso, Prof., 86
Mott, Dr. F. W., 392
Mozart, 340

NAPOLEON, 130, 252, 270, 376
Neisser, Prof., 362
Newman, 322
Newton, Sir Isaac, 270
Niven, Dr. James, 185

OSLER, Professor, 131, 310

PARKER, Archbishop, 378
Pasteur, 30, 31, 42, 133, 155
Pawlow, 253
Pettenkofer, 235
Pinero, A. W., 353
Platen, 44
Plato, 237

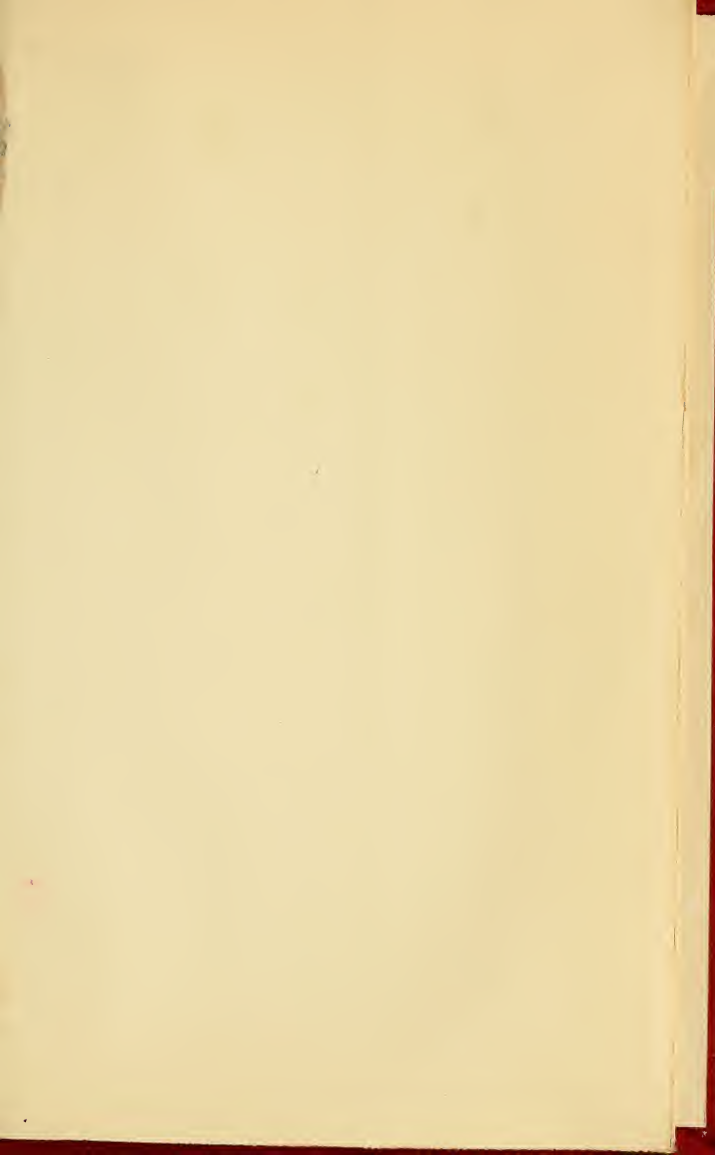
RAYLEIGH, Lord, 330
Reid, Dr. Archdall, 354, 38
390
Richet, Prof., 260
Rivers, Dr. W. H. R., 188
Roberts, John, billiard champion,
311
Rowntree, Mr., 198, 331
Ruskin, 325, 339, 376*n.*, 386

SCHILLER, 18, 310, 322
Schofield, Dr. A. T., 284
Shakespeare, 237, 360, 387
Shaw, Bernard, 68, 257
Spencer, Herbert, 21, 50, 86
92, 93, 190, 237, 238, 257, 268
271, 286, 317, 326, 352, 357
374, 376, 376*n.*, 382
Starke, Dr. J., 189
Stevenson, Robert Louis, 112
Sturge, Dr. Mary D., 188
Strauss, 340
Sullivan, Dr. W. C., 188

THOMSON, Prof. J. A., 376
386*n.*
Thoreau, 110
Treves, Sir Frederick, 268
Tschaikowsky, 340

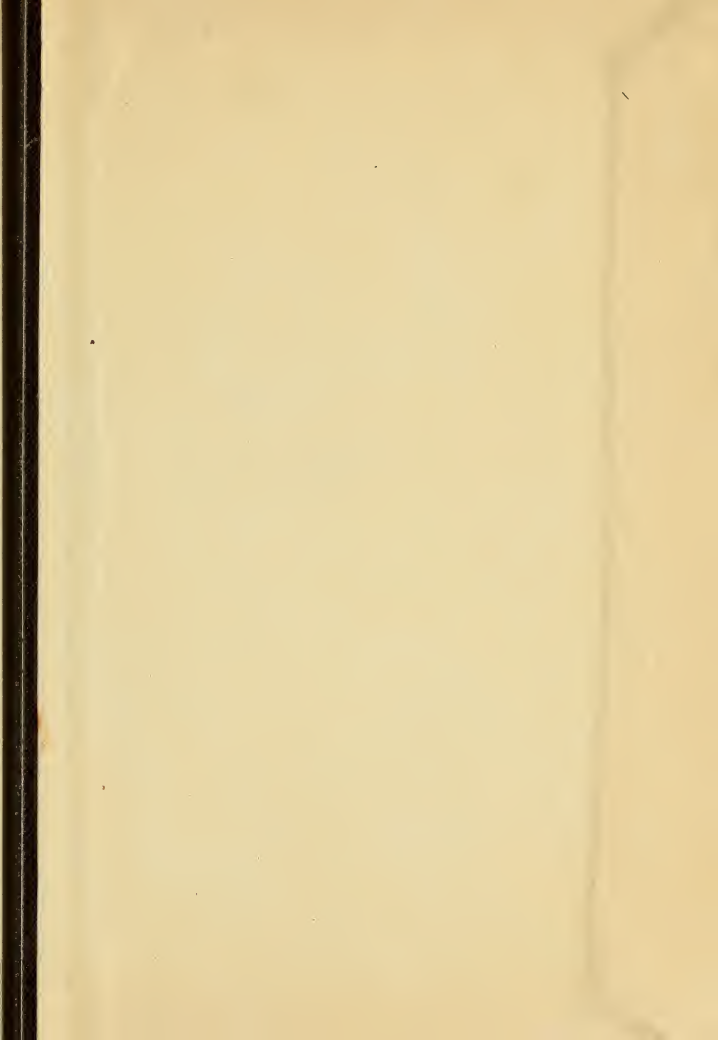
VERNE, Jules, 42
Virchow, 358
Voltaire, 132, 133, 378
Von Behring, 157

WAGNER, 340
Wallace, Dr. Sim, 296
Wallis, Mr. Edward, 301
Watson, Dr. Chalmers, 258
Weber, Sir Hermann, 117
Weismann, 371, 372, 373, 374
375, 384
Wellington, the Duke of, 270
White, Dr. Hale, 260
Woodhead, Prof. Sims, 173, 18
Wordsworth, 237, 317, 338

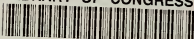








LIBRARY OF CONGRESS



0 022 169 856 3